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ABSTRACT

The Access Board of the Architectural and Transportation Barriers Compliance Board has issued this guide to assist in the use of its American with Disabilities Act Accessibility Guidelines (ADAAG) for buildings and facilities. It explains some of the basic considerations for accessible design and clarifies specific ADAAG provisions. Advisory information is provided in the form of recommendations that are optional and go beyond the minimum required by ADAAG. Information is categorized under the main areas of scoping and technical requirements for specific building areas such as toilet facilities, curb ramps, entrances, and elevators; and special occupancies covering dining facilities, medical facilities, libraries, and accessible transient lodging. Diagrams, layouts, and other illustrations are contained throughout the guide. (GR)

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ED 434 504

ADAAG Manual

a guide to the Americans with Disabilities Act Accessibility Guidelines

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U.S. Architectural and Transportation Barriers Compliance Board
July 1998

EF 005 626

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Americans with Disabilities
Act, Please call
1-800-949-4232 V/TTY
301-217-0124 V/TTY

ADAAG Manual

a guide to the Americans with Disabilities Act Accessibility Guidelines

WRITTEN BY:

THE ACCESS BOARD

ILLUSTRATED BY:

CADD MICROSYSTEMS, INC.
EVAN TERRY ASSOCIATES
PVA ARCHITECTURE

Illustration Credits:

Evan Terry Associates

The architectural firm of Evan Terry Associates, P.C. of Birmingham, Alabama provides consulting services, plan and construction review, training, accessibility surveys, barrier management databases, reports, and policy development reviews. The firm has developed a variety of guides and computer software on the ADA and accessible design. Illustrations developed for this manual by Evan Terry Associates appear on pages 8-11, 20-24, 31, 42, 43, 57

PVA Architecture

The Paralyzed Veterans of America (PVA) of Washington D.C. maintains a National Architecture Program that specializes in accessible design. This program provides guidance to PVA chapters and members on design issues relating to housing, civic projects, and other facilities, works with the Department of Veterans Affairs in monitoring the design and construction of VA medical facilities, and develops guides on accessible design. PVA Architecture's illustrations for this manual appear on pages 69, 70, 84-90, 97, 116-118, 126-130, 132, 135-137, 140.

CADD Microsystems, Inc.

CADD Microsystems, Inc. of Alexandria, Virginia provides professional consulting services in Computer Aided Design and Drafting and offers solutions in design, drafting, facilities management, and estimating. All other illustrations of this manual and its layout have been completed by CADD Microsystems.

About this manual

The Access Board has developed this manual to assist in the use of its ADA Accessibility Guidelines (ADAAG) for Buildings and Facilities. It explains some of the basic considerations for accessible design and clarifies specific ADAAG provisions in an effort to address frequently asked questions. Advisory information is provided in the form of recommendations; these recommendations are optional and go beyond the minimum required by ADAAG. It is important that this manual be used with a copy of ADAAG since it does not address or reprint all the information contained in ADAAG.

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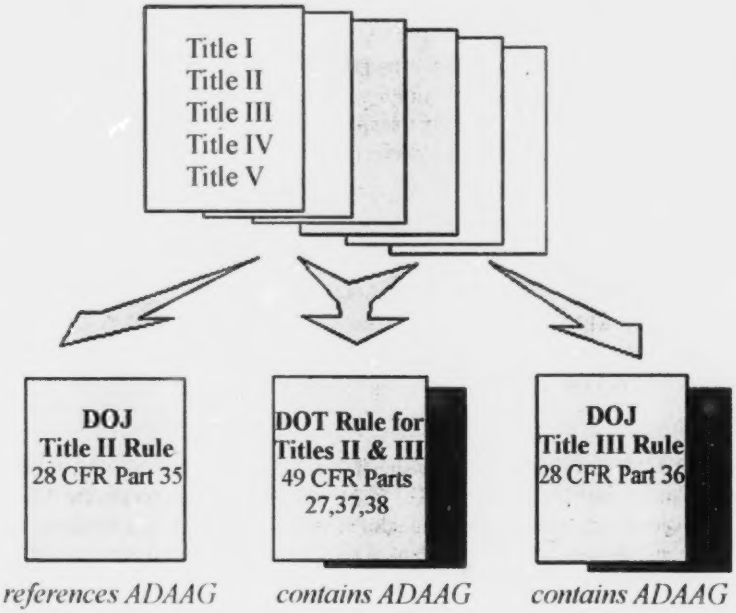
Introduction

The Americans with Disabilities Act (ADA) of 1990 recognizes and protects the civil rights of people with disabilities and is modeled after earlier landmark laws prohibiting discrimination on the basis of race and gender. The ADA covers a wide range of disability, from physical conditions affecting mobility, stamina, sight, hearing, and speech to conditions such as emotional illness and learning disorders. The ADA addresses access to the workplace (title I), state and local government services (title II), and places of public accommodation and commercial facilities (title III). It also requires phone companies to provide telecommunications relay services for people who have hearing or speech impairments (title IV) and miscellaneous instructions to Federal agencies that enforce the law (title V).


Title I
Title II
Title III
Title IV
Title V
DOJ Title II Rule 28 CFR Part 35
DOT Rule for Titles II & III 49 CFR Parts 27,37,38
DOJ Title III Rule 28 CFR Part 36
references ADAAG
contains ADAAG
contains ADAAG

Regulations that set requirements and establish enforcement procedures are necessary to implement laws such as the ADA. To understand and comply with the ADA, it is important to follow the regulations issued under the different titles. Comprehensive regulations for titles II and III issued by the Department of Justice (DOJ) and the Department of Transportation (DOT) include enforceable standards for the construction and alteration of buildings and facilities. These standards, which are based on the ADA Accessibility Guidelines (ADAAG), are enforced by DOJ, DOT and the courts and apply nationwide. The regulations provide important information on which buildings and facilities are subject to the standards. It is important that the regulations be used along with the design standards they contain or reference.

Private Sector Title III covers two types of facilities: places of public accommodation and commercial facilities. The DOJ regulation for title III defines these facilities and those that are exempt (religious entities and private clubs). This regulation contains enforceable standards based on ADAAG and addresses certain provisions in the standards (e.g., elevator exception, alterations to primary function areas).

State and Local Governments State and local government facilities are addressed in regulations issued by DOJ under title II. This regulation references standards based on ADAAG and allows the option of an earlier standard, the Uniform Federal Accessibility Standards (UFAS).

Public Transportation Facilities The DOT regulation covers public transit facilities such as bus stops and stations, rail stations, and airports. Standards in this regulation are based on ADAAG and include a special occupancy section on transportation facilities. The DOT regulations also include standards for transit vehicles operated by public or private entities.

Federal Facilities The ADA does not address Federal facilities because they are covered by earlier federal laws. The Architectural Barriers Act of 1968 requires access to buildings designed, built, altered, or leased with federal funds. The Rehabilitation Act of 1973 (section 504) requires access to federally funded programs and services. ADAAG derives in part from the standards used under these laws, the Uniform Federal Accessibility Standards (UFAS).

Housing All housing constructed or altered by or on behalf of state or local governments is required to be accessible under the ADA (title II). In the case of the private sector, the ADA's coverage of places of public accommodations (title III) includes some facilities used on a transient basis, such as dormitories and hotels. In general, other residential units (e.g., apartments) are not subject to the ADA except for places of public accommodation within them (e.g., rental offices). Note that distinctions made for purposes of ADA coverage do not coincide with typical building code classifications of "residential" occupancies. Access to housing is also required by the Fair Housing Amendments Act of 1988. This applies to privately and publicly owned buildings and includes guidelines for multi-family housing. The Department of Housing and Urban Development can provide further information on this law and its design requirements (see page 4).

ADAAG

ADAAG contains requirements for new construction and alterations of buildings and facilities. The Access Board develops the requirements as "guidelines" to serve as a basis for standards developed by the Department of Justice (DOJ) and the Department of Transportation (DOT). This is why ADAAG is part of the regulations issued by these agencies. Although ADAAG compliance is not generally reviewed during the permitting process for new construction or alterations, its application is not unlike that of a state or local building code, whose scoping requirements may be contained in the local adopting amendments, while the technical requirements are those of a model code. ADAAG derives from an earlier federal standard, the Uniform Federal Accessibility Standards (UFAS). The format and technical criteria of both stem from standards developed by the American National Standards Institute (ANSI).

Like most federal regulations, ADAAG was developed under a rule making process that invites public comment through publication in the Federal Register. It was published in July 1991 for places of public accommodation and commercial facilities covered by title III. It was also published in September 1991 for public transit facilities subject to title II (identical to the other but with a chapter covering bus stops and stations, rail stations, and airports). Changes and additions to ADAAG are also published through the same rule making process that provides public notice and the chance to comment. Revisions made to ADAAG and the standards since they were first published affect two sections: 4.29 Detectable Warnings (suspension of the requirement as it applies to curb ramps, hazardous vehicular areas, and reflecting pools) and 4.34 Automated Teller Machines (revision of specifications for clear floor space and control heights). Additional guidelines and revisions to ADAAG are being developed in several areas.

State and Local Government Facilities Changes and additions to ADAAG covering state and local government facilities were proposed in December 1992 and June 1994. Final minimum guidelines were published by the Board in January 1998. These guidelines include new chapters on judicial, regulatory, and legislative facilities (11), detention and correctional facilities (12), and miscellaneous changes to existing provisions. They will eventually become part of DOJ's enforceable standard.

Children's Environments In January 1998 the Access Board published final guidelines for building elements designed for use by children. These guidelines provide optional design criteria based on children's dimensions. (As originally published, ADAAG requirements were based only on adult dimensions). DOJ intends to incorporate these new guidelines into its enforceable standard.

Recreation Facilities and Outdoor Developed Areas These guidelines will cover amusement parks, play facilities, outdoor developed areas, golf courses, sports facilities, and boating and fishing facilities and other recreation facilities. The Board established an advisory committee in 1993 to develop recommended guidelines for its use in proposing a rule. The report containing these recommendations is available from the Board until final guidelines are issued.

ADAAG Review The Access Board intends to review and update ADAAG on a periodic basis. In 1995 the Board established the ADAAG Review Advisory Committee to review the full text and to recommend changes. The Committee completed its work in 1996 and issued a report which the Board will use in proposing actual changes to ADAAG. This report is available from the Board.

ADA Information Sources

The Access Board **800-872-2253 TTY: 800-993-2822**
The Access Board can provide additional guidance on, or copies of, ADAAG and UFAS. Toll-free technical assistance is available weekdays from 10:00 to 5:30 (EDT). Information is also available through the Board's web site (http://www.access-board.gov).

U.S. Department of Justice **800-514-0301 TTY: 800-514-0383**
The Department of Justice regulates and enforces requirements for state and local governments and the private sector under titles II and III of the ADA and provides technical assistance on the regulations it has issued under these titles.

U.S. Department of Transportation **888-446-4511 TTY: 202-366-0153**
The Department of Transportation regulates and enforces requirements for transportation access under titles II and III of the ADA.

U.S. Equal Employment Opportunity Commission **800-669-4000 TTY: 800-669-6820**
The Equal Employment Opportunity Commission regulates and enforces title I of the ADA which covers employment.

Internal Revenue Service **800-829-3676 TTY: 800-829-4059**
The Internal Revenue Code includes tax credits and deductions for expenses related to compliance with the ADA.

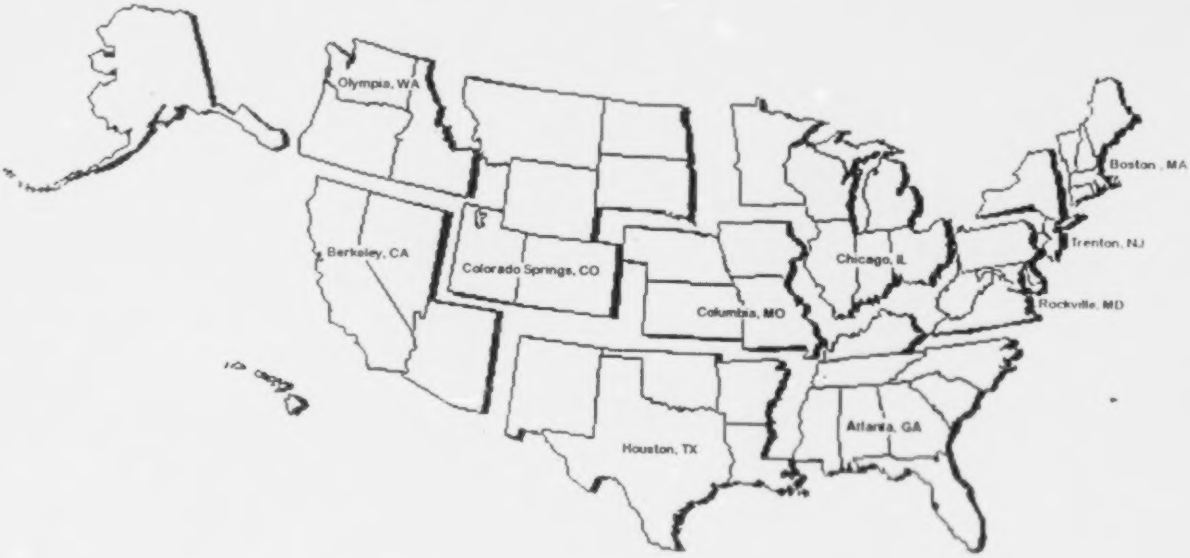
Information Sources for Accessible Housing

U.S. Department of Housing and Urban Development **800-795-7915 TTY: 800-927-9275**
Fair Housing Information Clearinghouse **800-343-3442 TTY: 800-483-2209**
Center for Universal Design **800-647-6777**
Information on the Fair Housing Act, which covers multi-family housing in the private and public sectors, is available from these entities. The Center for Universal Design can provide additional guidance on accessible home design.

Information Services

Disability and Business Technical Assistance Center **800-949-4232 (voice or TTY)**

ADA information and assistance is also available closer to home through ten regional technical assistance centers across the country set up through a Federal grant. These centers can provide ADA information available from most of the Federal agencies listed on the previous page. Calling the toll-free number connects you to the center serving your area.


Olympia, WA
Boston, MA
Berkeley, CA
Colorado Springs, CO
Chicago, IL
Trenton, NJ
Columbia, MO
Rockville, MD
Atlanta, GA
Houston, TX

ADAAG provides both scoping and technical requirements. Scoping provisions in 4.1 spell out which spaces and elements must meet the technical criteria in sections 4.2 through 4.35. Special occupancy sections (5 through 10) apply additional scoping and technical provisions to certain facility types. Information in the appendix is advisory (non-mandatory) and noted by an asterisk (*). In general, specific provisions take precedence over general requirements and words and text over figures (although some figures contain requirements not specified in text). Furniture, furnishings, and equipment not fixed to building construction are not scoped or specified in ADAAG but may be covered by other provisions in the DOJ or DOT regulations.

A "reserved" provision means that no requirement is currently specified. In most cases, it signifies that a provision was considered but not included (often because of a lack of information or consensus) or included but later removed. A reserved status does not necessarily mean a requirement is pending.

GENERAL

Provisions for Adults [2.1]

ADAAG specifications are based on adult dimensions. Specifications for elements used primarily by children have been developed and incorporated into ADAAG (although they are not addressed in this edition of the manual). These optional specifications address drinking fountains, water closets, toilet stalls, lavatories, sinks, and fixed or built-in seating and tables.

Equivalent Facilitation [2.2]

Alternatives to specific requirements that provide equal or greater access are permitted. This provides flexibility for new technologies and innovative designs solutions that may not have been taken into account when ADAAG was developed. Examples of equivalent facilitation are included in the text of ADAAG. The Access Board can provide further guidance on what may be considered equivalent but there is no process for certifying alternative methods except in transit facilities covered by DOT regulations. The responsibility for demonstrating equivalent facilitation in the event of a challenge rests with the covered entity. In the case of transit facilities, the Federal Transit Administration does make official determinations of equivalent facilitation.

MISCELLANEOUS INSTRUCTIONS AND DEFINITIONS

Graphic Conventions [3.1]

Dimensions in ADAAG and this manual are absolute unless noted as a maximum or minimum. ADAAG includes in text and figures the metric equivalent (in millimeters). ADAAG uses rounded-off ("soft") metric conversions in most cases; more precise ("hard") conversions may be incorporated in future revisions of the guidelines.

Dimensional Tolerances [3.2]

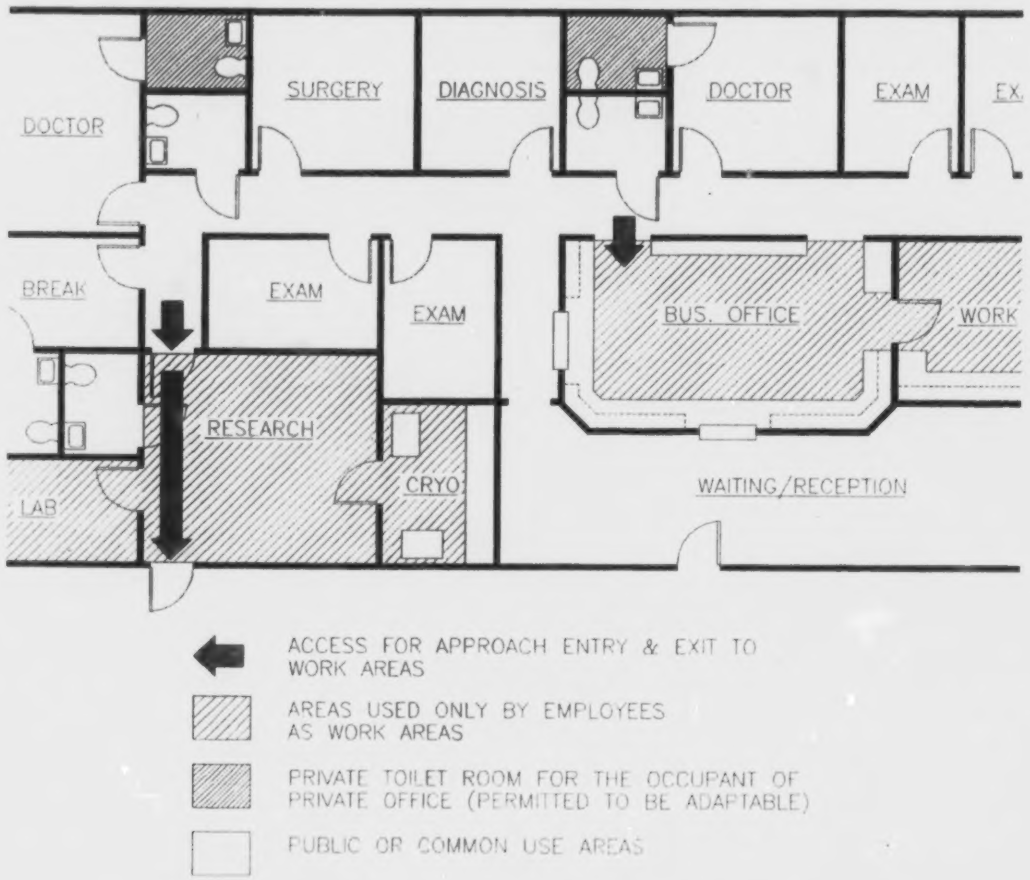
ADAAG recognizes conventional industry tolerances for field conditions. This applies to the field work, not the design work. Information on specific tolerances may be available from industry or trade organizations, code groups and building officials, and published references. *Recommendation:* It is good practice to avoid specifying precisely to the maximum or minimum where possible so that achieved dimensions fall within ADAAG requirements.

APPLICATION [4.1.1]

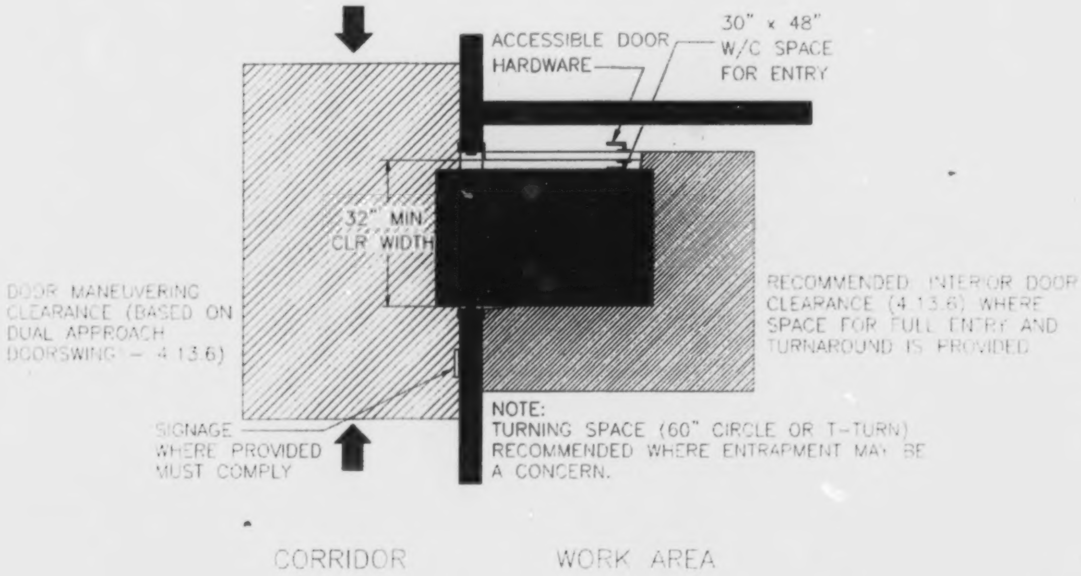
Work Areas [4.1.1(3)]

ADAAG, as issued under titles II and III of the ADA covering public access, makes a distinction between public or common use areas, which must be fully accessible, and areas used only by employees as work areas. Access is required to, not fully within, work areas in part because the ADA (title I) treats access for employees with disabilities as an accommodation made when the need arises. Employee spaces used for purposes other than job-related tasks (breakrooms, lounges, parking, shower and locker rooms, etc.) are considered "common use" and are required to be fully accessible. Work areas that also function as public use space, such as patient exam rooms, must be fully accessible for public access; fixtures and controls within used only by employees are not required to comply.

In a health care facility for example, spaces used by the public typically include waiting and reception areas, exam and diagnostic rooms, doctors' offices, and restrooms. Breakrooms and employee restrooms are considered common use areas and are required to be fully accessible although restrooms serving the individual of a specific space, such as a doctor's office, are permitted to be "adaptable" (i.e., designed so that certain elements can be added or altered for access after construction). Areas used only by employees as work areas include business or administrative offices and the receptionist side of counters, research facilities, supply rooms and laboratories. Note that an accessible route through one work area ("research,") may be needed to provide access to an exit as part of an accessible means of egress.


DOCTOR
SURGERY
DIAGNOSIS
DOCTOR
EXAM
EX.
BREAK
EXAM
EXAM
BUS. OFFICE
WORK
RESEARCH
CRYO
LAB
WAITING/RECEPTION
ACCESS FOR APPROACH ENTRY & EXIT TO WORK AREAS
AREAS USED ONLY BY EMPLOYEES AS WORK AREAS
PRIVATE TOILET ROOM FOR THE OCCUPANT OF PRIVATE OFFICE (PERMITTED TO BE ADAPTABLE)
PUBLIC OR COMMON USE AREAS

Work areas must be accessible for "approach, entry, and exit," which means location on an accessible route so that people using wheelchairs can enter and back out of the space. This includes accessible entry doors or gates. *Recommendations:* Space for turning within the work area and interior maneuvering clearances at doors, while not required, should be considered, especially where entrapment may be a concern (i.e., entry doors with closers); interior door clearances are recommended where space for full entry and turning is available within a work area. Maneuvering space and accessible or adaptable elements (e.g, work surfaces) will facilitate accommodation of employees. For this reason, it is recommended that where multiple work stations of the same type are provided (e.g., ticket and toll booths) at least 5 percent be fully accessible.


ACCESSIBLE DOOR HARDWARE
30" x 48" W/C SPACE FOR ENTRY
32" MIN CLR WIDTH
DOOR MANEUVERING CLEARANCE (BASED ON DUAL APPROACH DOORSWING – 4.13.6)
RECOMMENDED INTERIOR DOOR CLEARANCE (4.13.6) WHERE SPACE FOR FULL ENTRY AND TURNAROUND IS PROVIDED
SIGNAGE WHERE PROVIDED MUST COMPLY
NOTE: TURNING SPACE (60" CIRCLE OR T-TURN) RECOMMENDED WHERE ENTRAPMENT MAY BE A CONCERN.
CORRIDOR
WORK AREA

New Construction [4.1.2 and 4.1.3]

Sections 4.1.2 and 4.1.3 indicate which areas or elements of exterior sites and buildings are required to meet ADAAG's technical criteria in new construction. Compliance is required except where "structurally impracticable," a term intended to cover unique characteristics of the terrain that effectively prevent full compliance (e.g., structures built in flood plains that must be raised on stilts). Provisions in 4.1.2 and 4.1.3 are discussed in the relevant technical chapters of this manual.

Additions [4.1.5]

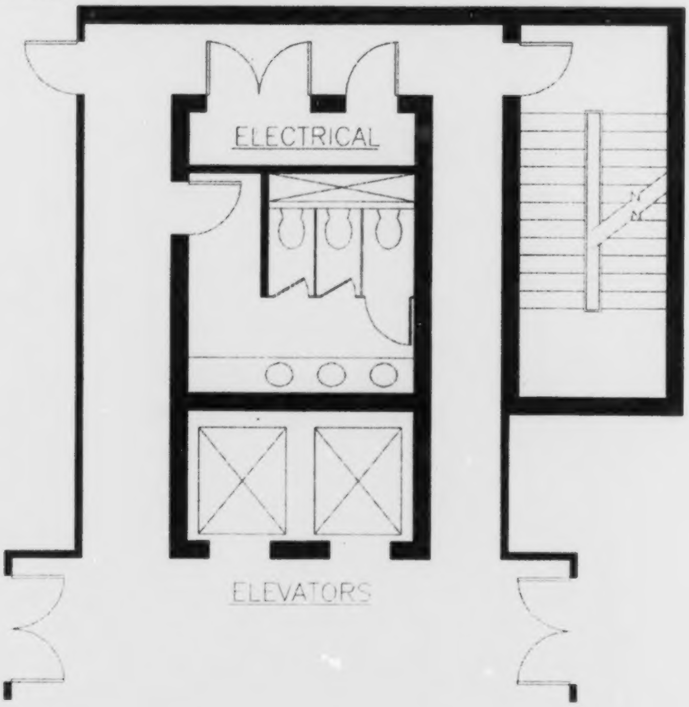
Each addition to an existing building is regarded as an alteration subject to ADAAG alterations requirements (including triggering of path of travel obligations, if applicable). To the extent that a space or element is newly constructed as part of an addition, it is also regarded as new construction and must comply with the applicable new construction provisions of ADAAG. Certain allowances made on the basis of technical infeasibility are permitted in alterations, but not in new construction. They are intended to cover portions of existing buildings altered in an addition, but not those portions that are newly built.

Alterations [4.1.6]

General [4.1.6(1)]

ADAAG sets minimum requirements for accessibility in alterations. New construction technical criteria are applied to each element or space altered where technically feasible. Compliance can be followed on an element-by-element basis, except where the work amounts to full alteration of a room or space, in which case the room or space must be made fully accessible. For example, if a toilet room renovation is limited to replacement of a lavatory and reflooring, then the new lavatory and floor must comply; where the work is more extensive and also involves moving walls and stall partitions, then the room itself must be brought into full compliance. Compliance is required in either case to the maximum extent it is "technically feasible." As defined in ADAAG, this covers existing structural or space constraints that prohibit compliance, such as removing or altering a load-bearing member of the structural frame. Other examples might include:

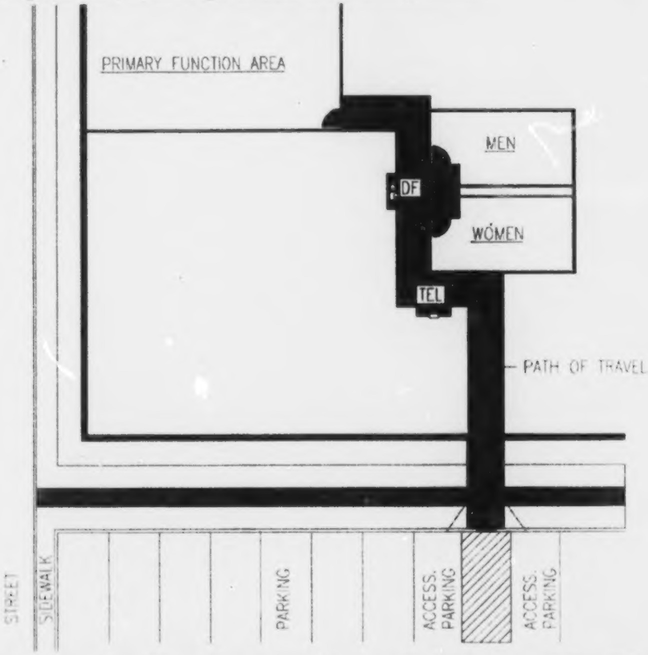
- widening of a toilet stall that would reduce the number of fixtures below that required by code
- achieving level slopes at accessible parking where work involves resurfacing but not regrading
- limitations imposed by existing walls that are not being moved or altered, elevator hoistway shafts, electrical closets, or means of egress when additional space is necessary to make an existing room, such as a restroom, accessible.



Provisions in 4.1.6(1) clarify compliance in relation to certain elements. New construction scoping remains the basis so that compliance in an alteration is not interpreted as requiring a higher level of access. For example, 4.1.6(1) describes the type of work that triggers provision of vertical access between floors (major structural modification resulting from replacement or addition of stairs or escalators); this does not apply to buildings that would be exempt from the requirement for an elevator in new construction (the exemption is repeated in the alterations section).

Primary Function Areas [4.1.6(2)]

If alterations are made to an area containing a primary function, an accessible "path of travel" is required which means a continuous route connecting the altered area to an entrance, including phones, restrooms, and drinking fountains that, where provided, serve the altered area. Since this may involve modifications outside the intended alteration, compliance is required to the extent it is not "disproportionate" to the cost of alterations to the primary function area; "disproportionality" is defined in the DOJ rule (section 36.403) as costing more than 20% of the cost of the alteration to the primary function area. This rule and the DOJ technical assistance manual for title III provide important information on this requirement, including the definition of key terms.



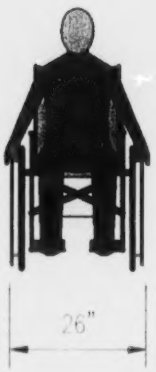
Special Technical Provisions for Alterations to Existing Buildings and Facilities [4.1.6(3)]

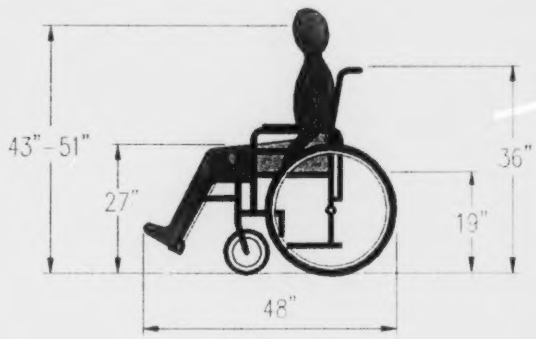
Section 4.1.6(3) recognizes certain allowances where technical feasibility is encountered, such as steeper slopes for short ramps. Special provisions also address stairs, elevators, doors, toilet rooms, assembly areas, platform lifts, and dressing rooms. These provisions are discussed in the relevant technical chapters of this manual.

Historic Preservation [4.1.7]

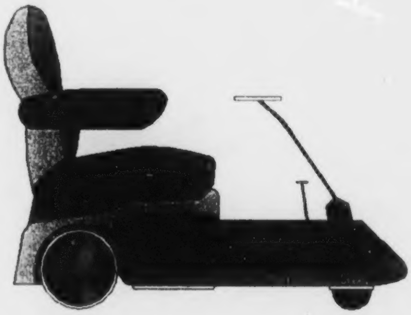
ADAAG covers historic properties in the context of planned renovations to qualified historic facilities, including those subject to the National Historic Preservation Act. "Qualified historic facilities" are facilities listed in the National Register of Historic Places or facilities designated as historic under state or local law. Alterations to such facilities are required to be done in full compliance with the alteration requirements for other types of buildings. However, if following the usual requirements would threaten or destroy the historic significance of a feature of the building, alternative criteria in 4.1.7(3) may be used. These requirements address accessible routes, ramps, entrances, toilet rooms, access between floors, and displays. The decision to use these alternative requirements must be made in consultation with the appropriate advisory board designated in 4.1.7(2).

Space Allowances and Reach Ranges [4.2]



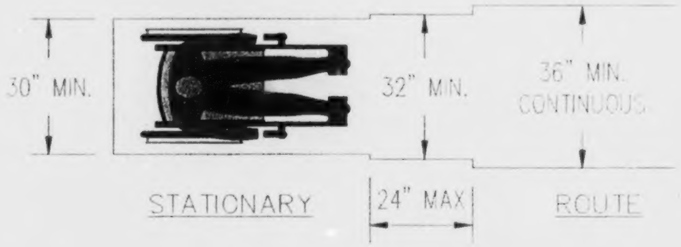


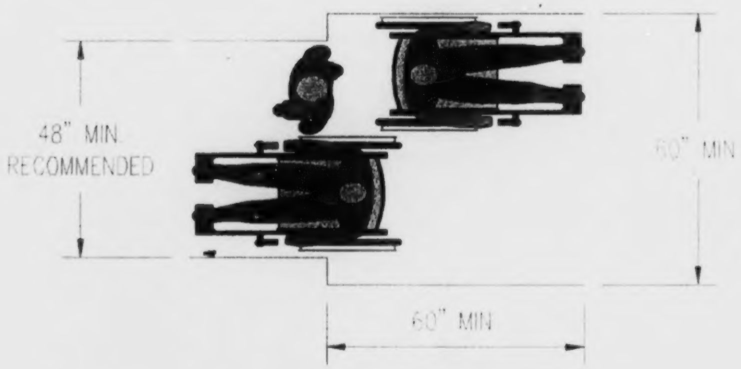
Adult dimensions and measures for standard manual wheelchairs form the basis of many ADAAG specifications. For example, the specified height of toilets and shower seats (17 - 19 inches) approximates the standard seat height of manual wheelchairs to facilitate transfer. They can also provide guidance on aspects of design not specifically covered in ADAAG, such as the standard eye level range (43 - 51 inches) and the design and height of elements viewed up close or from above (e.g., certain information screens and display cases).



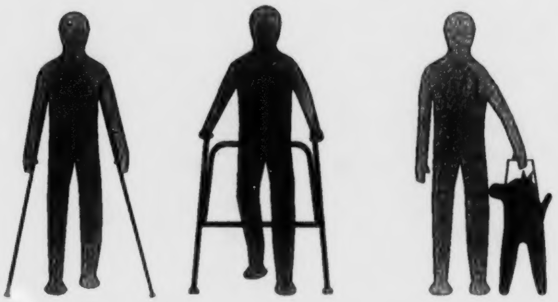
Space at least 30 by 48 inches is the minimum required for a person using a wheelchair. Manual wheelchairs and motorized devices, which are increasingly popular, vary considerably in size and design. Some types, especially scooters, are longer than manual wheelchairs. They also have front tillers and different operating characteristics, such as larger turning radii.

Wheelchair Passage Width [4.2.1] and Passing Space [4.2.2]


30" MIN.
32" MIN.
36" MIN. CONTINUOUS
STATIONARY
24" MAX
ROUTE


48" MIN. RECOMMENDED
60" MIN
60" MIN

A minimum width of 30 inches is generally sufficient for stationary space. Additional clearance is needed for maneuvering and sway. A clear width of at least 48 inches (recommended but not required) allows for comfortable flow for people who use wheelchairs and people who are ambulatory. Space at least 60 inches wide is the minimum width that allows passage of two wheelchairs.

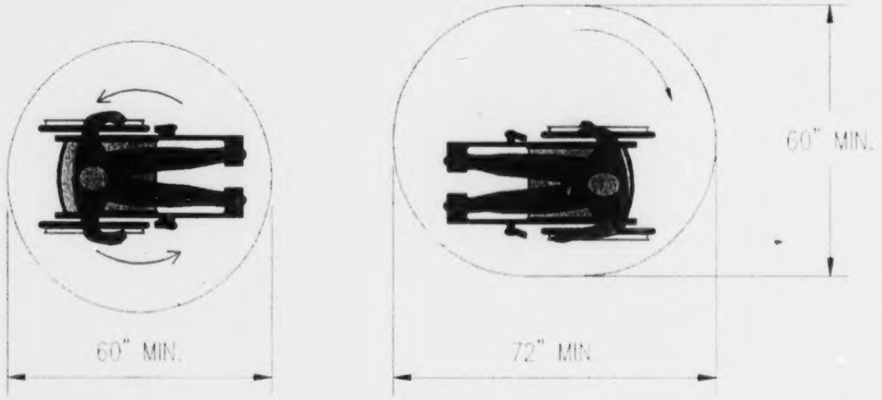


A continuous clear width of 36 inches is the minimum needed by people who use walking aids or service animals.

Wheelchair Turning Space [4.2.3]

Circular Turns

The most efficient way of making a half or full turn in a manual wheelchair is by turning the wheels in opposing directions. Repeated maneuvering is often necessary for people unable to turn this way, including those who use motorized wheelchairs and scooters. *Recommendation:* Larger space in the shape of an oval, as recommended in the ADAAG appendix, can allow easier maneuvering for turns.

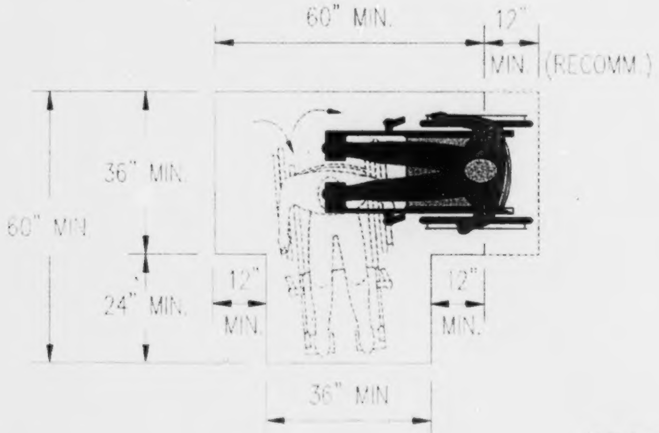


REQUIRED

RECOMMENDED

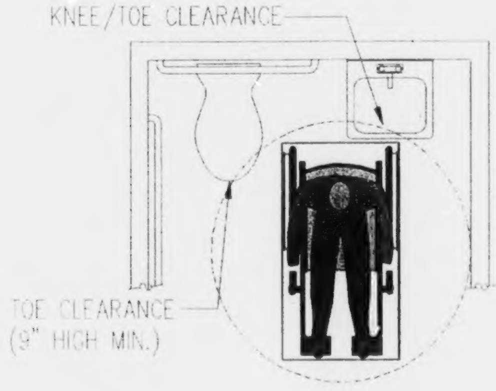
T-Shaped Turns

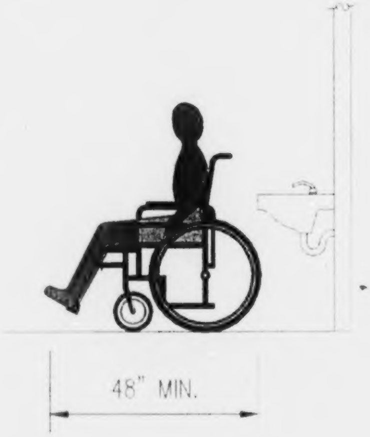
Space for 3-point turns can be provided in the space of a T. This space can be configured for approach on any segment of the T. *Recommendation:* Additional space that allows 60 inches on each leg of both turns will ease maneuvering.



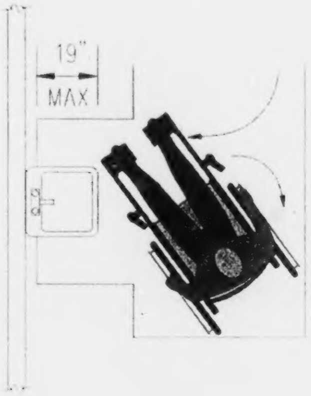
Overlapping Fixed Elements

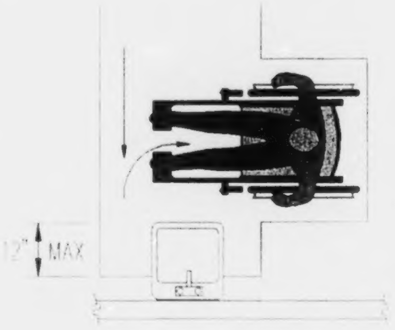
Fixed elements can overlap turning space if required knee and toe clearances are provided. Since maneuvering for turns varies, the overlap of fixed elements should be minimized. *Recommendation:* Where space for turns is confined to the minimum, consider limiting the overlap so that wheelchair space (30 by 48 inches minimum) remains clear.



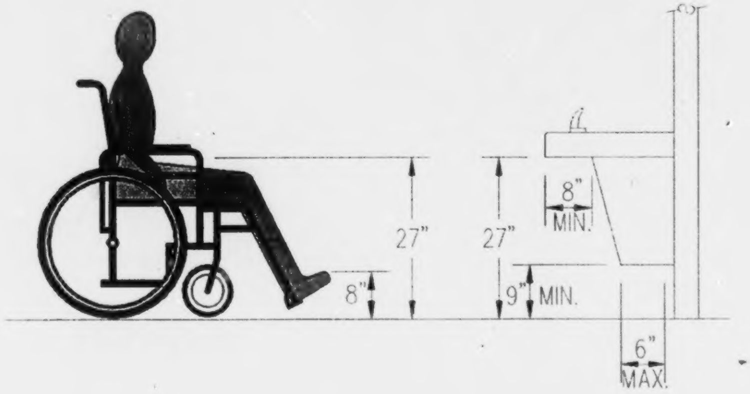


Generally, the depth of usable floor space below fixed elements with knee and toe clearance is limited to 19 inches. The overlap of turning space must be limited to one segment of the T so that back-up maneuvering is not restricted. On the short segment of the T, the overlap must be limited to 12 inches; on the long segment of the T, an overlap up to 19 inches is permitted.

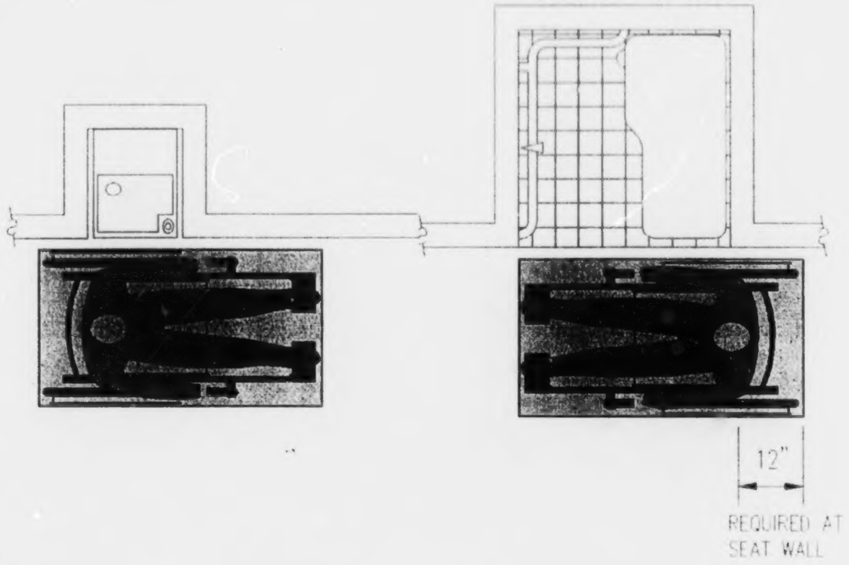




Clear Floor Space [4.2.4]



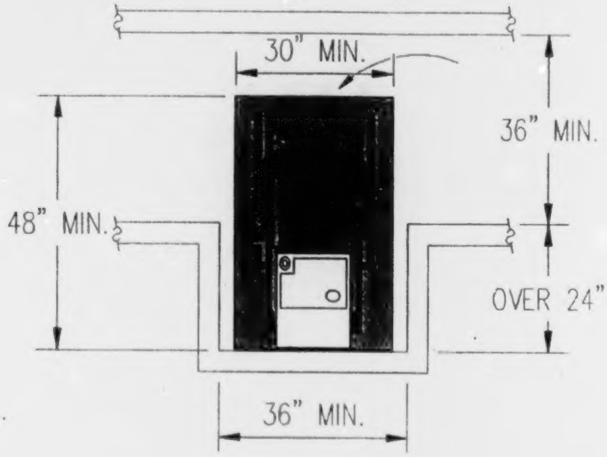
A clearance at least 27 inches high and 19 inches deep is necessary for a person using a wheelchair to pull-up to tables and counters. Clearances below plumbed fixtures are further defined specifically for toe space because of piping below the fixture. The clearance between knee and toe space, while not defined by a specified height, should be maximized for leg room. Clearances are measured in relation to the usable clear floor space, not necessarily to the vertical support.



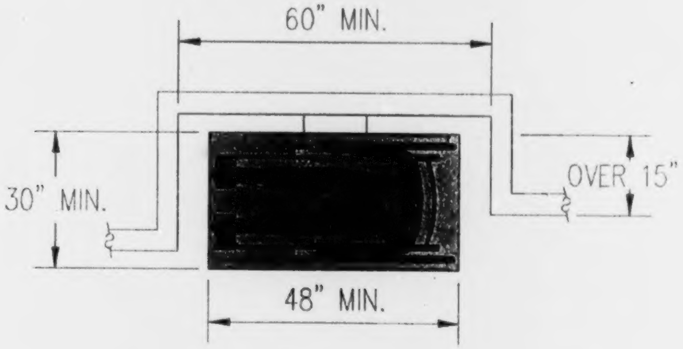
Clear floor space for side approaches should be located so that the element or fixture can actually be used by a person using a wheelchair.

Maneuvering into Clear Floor Space

Where a turn is required to enter the clear floor space, additional maneuvering room is needed. The additional clearance required for clear floor space in alcoves can be used as a guide.

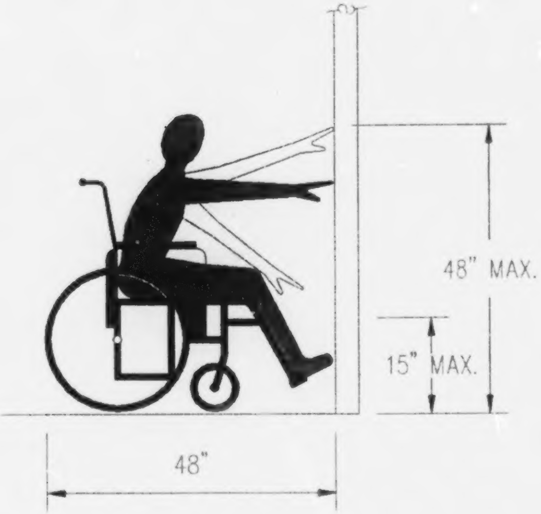

30" MIN.
36" MIN.
48" MIN.
OVER 24"
36" MIN.

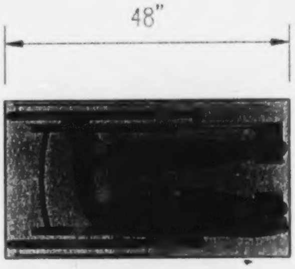
A recess length at least 60 inches long is required where the recess is 15 inches or more in depth.


60" MIN.
30" MIN.
OVER 15"
48" MIN.

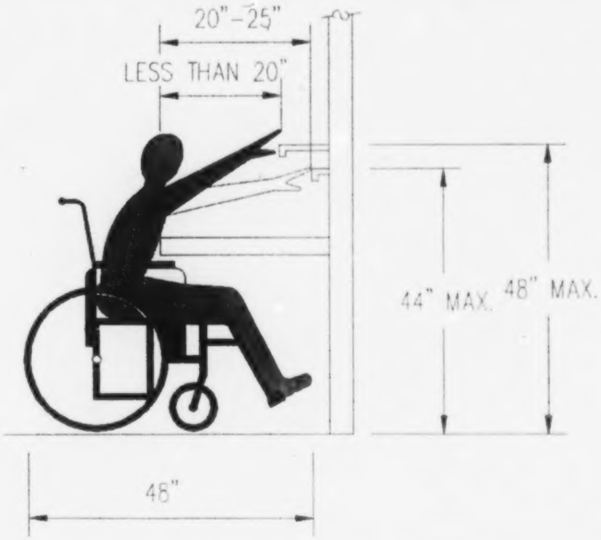
Forward Reach [4.2.5]

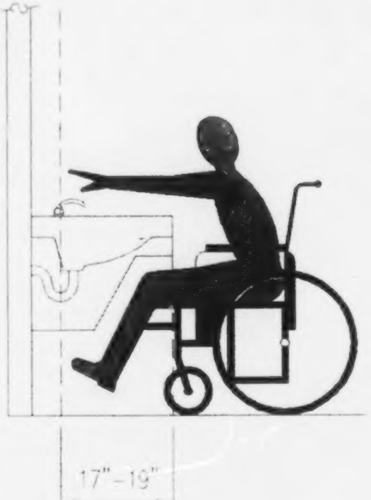
Many people in wheelchairs may not be able to reach far beyond their toes. Forward reaches are measured to the edge of available clear floor space. This accommodates high and low reaches and assumes some forward bending.





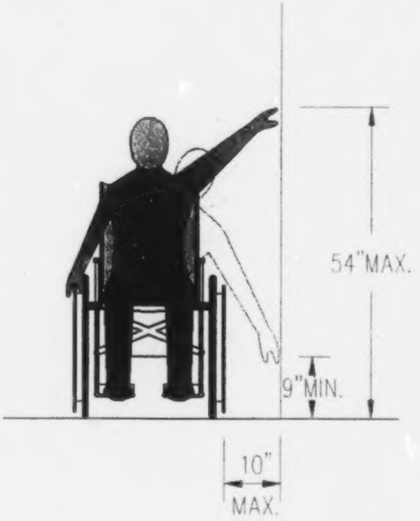
Since the forward reach over an obstruction is limited by how far a person using a wheelchair can pull up below it, the depth of reach cannot exceed the amount of usable clear floor space (25 inches maximum). This is important at lavatories and other plumbed fixtures where pipes and enclosures can limit how far one can pull up (17 inches minimum and 19 inches maximum). To be within easy reach, faucets and the operable portions of soap or towel dispensers should be located within, not beyond, the clear floor space.

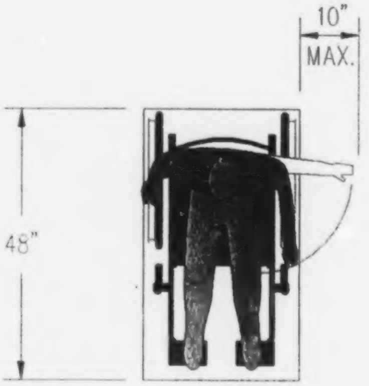




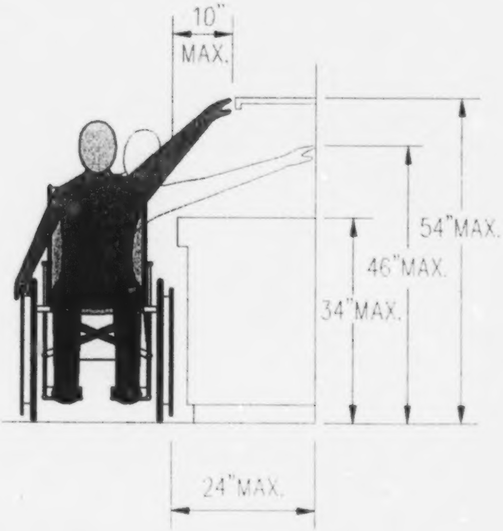
Side Reach [4.2.6]

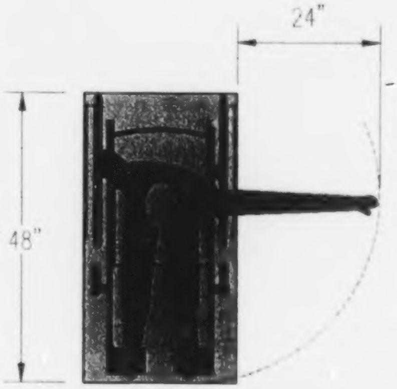
High and low reaches are based on a depth of reach no greater than 10 inches measured from the available clear floor space. It is important that clear floor space be available at objects according to the recognized reach radius.





Since the height of reach decreases with depth, the maximum high reach is limited to 46 inches over obstructions no more than 24 inches deep and 34 inches high. Further guidance on reach heights according to depth is available from specifications for automated teller machines in ADAAG 4.34 (see page 125).



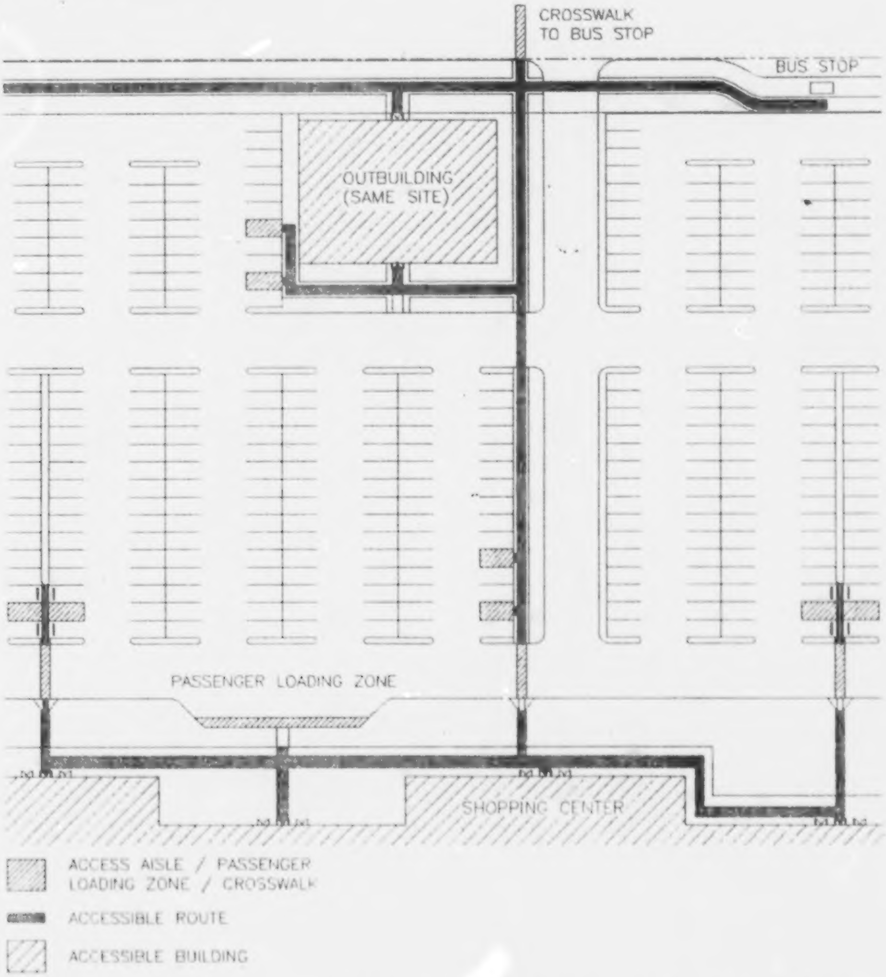


4.3 Accessible Route

Scoping [4.1.2(1), 4.1.3(1)] and Location [4.3.2]

Clear width, surface texture, running and cross slope, and the treatment of changes in level help determine the usability of walking surfaces by people with mobility impairments. At least one accessible route within the boundary of sites must connect accessible building entrances to:

- accessible parking and passenger loading zones
- public transportation stops
- public streets or sidewalks


CROSSWALK TO BUS STOP
BUS STOP
OUTBUILDING (SAME SITE)
PASSENGER LOADING ZONE
SHOPPING CENTER
ACCESS AISLE / PASSENGER LOADING ZONE / CROSSWALK
ACCESSIBLE ROUTE
ACCESSIBLE BUILDING

An accessible route is not required to connect directly to site boundaries not bordered by a pedestrian way (e.g., where site entry is by vehicle only). *Recommendations:* Where transit stops are not located within site boundaries, accessible routes should be configured to connect with public rights-of-way to provide convenient access between them and the site. It is important that accessible routes coincide with general routes to the greatest degree possible for equality and convenience. Where an alternate route is necessary for access, travel distances from the general route needs to be minimized. Signage may be necessary along routes to minimize confusion or back-tracking.

At least one accessible route is required to connect buildings, facilities, elements, and spaces that are on the same site. *Recommendation:* Accessible routes can cross vehicular ways but it is recommended that they be marked as a pedestrian crossing.

Width [4.3.3.] and Passing Space [4.3.4]

A continuous minimum clear width of 36 inches is required for accessible routes, but a reduction to 32 inches is allowed for a linear distance of no more than 24 inches (e.g., a doorway). However, the minimum width of hallways and corridors is often further determined by ADAAG requirements for clear floor space at elements such as drinking fountains, door maneuvering clearances, and turns around obstructions. Wheelchair passing space at least 60 by 60 inches must be provided at reasonable intervals that do not exceed 200 feet.

Head Room [4.3.5]

The 80 inch minimum vertical clearance applies not only to accessible routes but to all circulation routes (see 4.4.2). Eighty-inch doors, including those equipped with closers, are considered acceptable under this requirement.

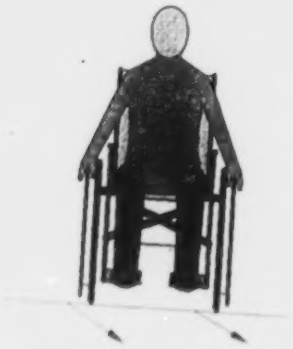
Surface Texture [4.3.6]

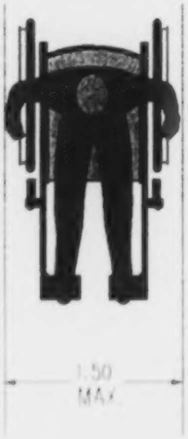
Accessible routes do not necessarily have to be paved, but must be "firm, stable, and slip-resistant" so that they are safe and usable by people who use wheelchairs or who walk with difficulty. Since there are no uniform test procedures or measurable values for these characteristics (except for slip-resistance), acceptable and unacceptable materials are not easy to categorize. Also, compaction, consolidants, grid forms and other treatments often make a difference in the usability of a certain material. In developing various outdoor environments, consultation with people with disabilities, including local groups and officials, can be helpful in determining acceptable designs and surface materials.

Slope [4.3.7]

Requirements in 4.3, while based on the expectation of level floors, apply equally to exterior sites. Where the running slope of an accessible route exceeds 5% it must be treated as a ramp or curb ramp.

A maximum cross slope of 2% is recognized for drainage. Steep cross slopes make travel by wheelchairs, including many power chairs, difficult by causing front casters to veer. They also disrupt the balance of force used in propelling both wheels of manual chairs. Keep in mind that where routes cross, the running slope of one acts as a cross slope to the other.





Edge Protection

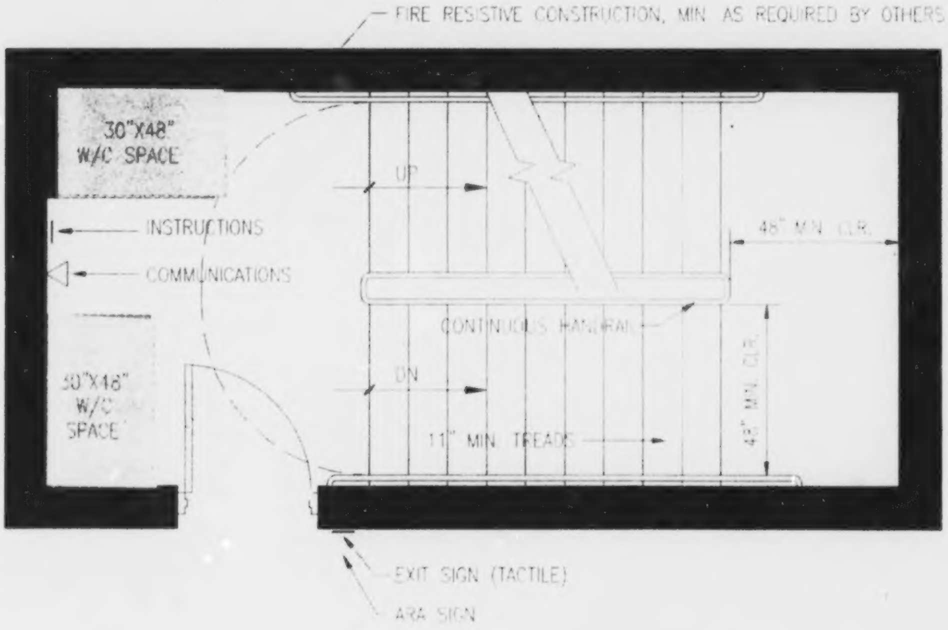
ADAAG addresses drop-offs along ramps and ramp landings but not along other portions of accessible routes or circulation paths. While building codes address drop-offs over certain depths, even shallow drop-offs can disrupt access along narrow routes when a wheelchair slips off the edge. Deeper drop-offs can pose a tipping hazard. *Recommendation:* At narrow routes in particular, consider maintenance of adjacent surfaces as raised or flush or wider route widths in consideration of minimum maneuvering and passage requirements (i.e., at least 48 inches is considered necessary for a person walking and a person using a wheelchair to pass). For deep drop-offs along level routes, requirements for ramps (see pages 44 and 45) can be used as a guide in providing adequate edge protection.

Egress [4.1.3(9), 4.3.10]

Accessible means of egress are required according to the number of exits provided to meet the building or life safety code. Accessible "means of egress" include exit access, exits, and exit discharge. Stairs, steps, and escalators cannot be part of an accessible means of egress. In multi-story buildings where stories are located above or below the level of exit discharge, evacuation elevators can be used as part of an accessible means of egress. Otherwise, in new construction, ADAAG requires areas of rescue assistance unless the building is equipped with a supervised automated sprinkler system.

Areas of Rescue Assistance [4.1.3(9), 4.3.11]

Areas of rescue assistance are fire-rated spaces where people unable to use stairs can await evacuation assistance from emergency personnel. Communication devices in these areas connected to the primary entry (or other approved location) provide indication of where this assistance is needed. Areas of rescue assistance are not required in alterations, non-occupiable spaces, open-air structures, or buildings equipped with "supervised automated sprinkler systems," which are systems with built-in signals used to monitor system features (the opening and closing of water control valves, the power supplies of needed pumps, water tank levels, etc.) and to indicate conditions that will impair satisfactory operation. Section 4.3.11 outlines specific areas that may be designed as an area of rescue assistance, including stairway landings, exit balconies, and corridors. Because exit stairs are often required to be fire resistant by fire or life safety codes, areas of rescue assistance are often located at landings.



Wheelchair spaces must be located outside required exit widths. The minimum 48 inch width, measured between the leading edge of handrails, provides clearance for assisted evacuation. This requirement applies to stairs adjacent to areas of rescue assistance, not necessarily those required to comply with 4.9. *Recommendation:* While requirements in 4.9 (i.e., for treads, risers, nosings, and handrails) apply only where stairs are the only means of connection between floors, such as in buildings without elevators, compliance is still a good idea since elevators typically cannot be used in emergencies.

Other spaces, such as individual offices, can be designed and constructed according to these specifications and used as an area of rescue assistance where approved by the appropriate local authority. ADAAG also recognizes horizontal exits when constructed in accordance with local building code, as an alternative to areas of rescue assistance.

Two-Way Communication [4.3.11.4]

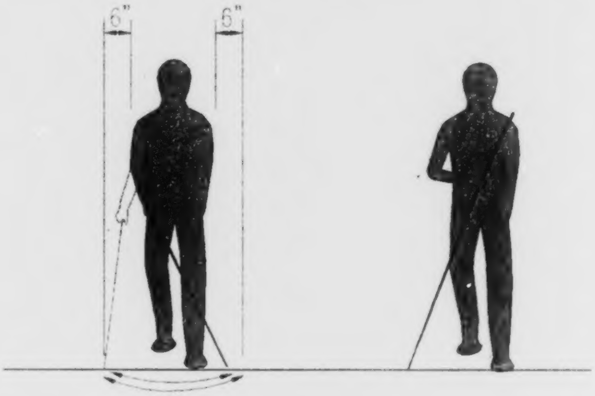
The two-way communication system must be equipped with both audible signals (for people with vision impairments) and visual signals (for people with hearing impairments) and cannot operate solely through voice communication. Audible signals can include voice output or recorded messages. A button that lights to indicate that help is on the way when the call is answered is an acceptable visual signal.

Identification [4.3.11.5]

The "AREA OF RESCUE ASSISTANCE" label and access symbol must be illuminated where fire or life safety codes require illuminated exit signs. This label, as well as directional signage at inaccessible exits and instructions on using the space, are subject to requirements for character proportion (4.30.2) and height (4.30.3) and sign finish and contrast (4.30.5). Requirements for tactile (raised and Braille) signage apply to exits and other designations of "permanent rooms and spaces." These requirements address raised and Braille characters (4.30.4), finish and contrast (4.30.5), and mounting location and height (4.30.6).

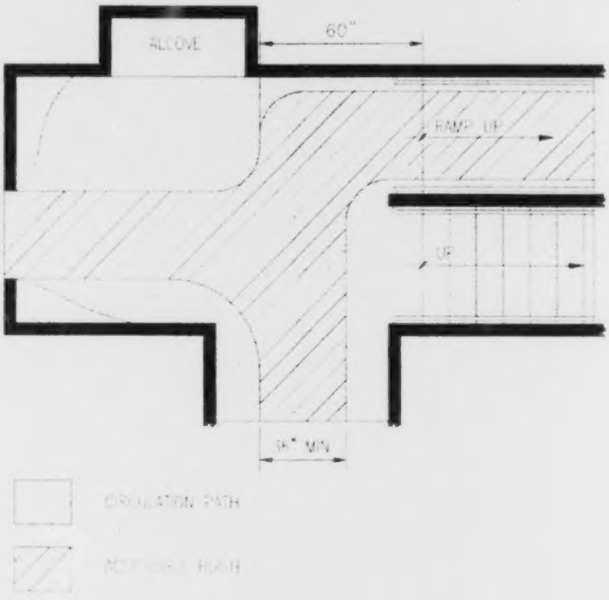
Protruding Objects [4.4]

Requirements in 4.4 are based on standard cane techniques used by people with vision impairments. There are two principal techniques: the **touch technique** and the diagonal technique. People are often trained to use both. The touch technique involves arcing the cane side-to-side to detect points beyond both shoulders and is often used in uncontrolled areas. The **diagonal technique** involves holding the cane in a stationary position diagonally across the body with the bottom tip at the ground beyond one shoulder and the grip extending beyond the other shoulder. This technique is generally used in certain controlled and familiar environments. The standard sweep of canes allows detection of objects with leading edges up to 27 inches from the floor.



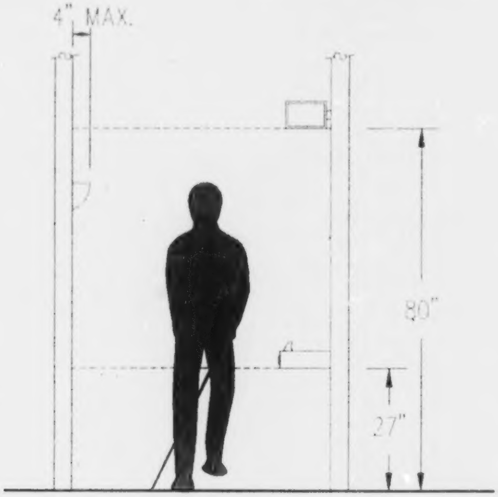
Scoping [4.1.2(3), 4.1.3(2)]

Requirements for protruding objects apply to all circulation routes, including both accessible and inaccessible routes and include corridors, walks, courtyards, stairways, and areas of circulation.



Wall-Mounted Objects

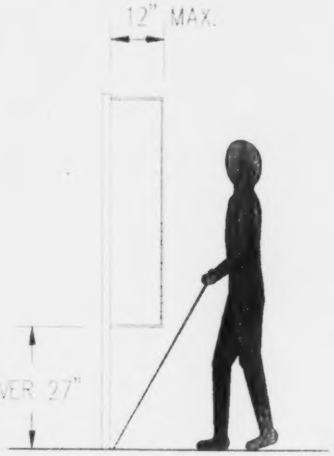
Proper cane and service animal techniques allow people to walk along a corridor or path without bumping into walls. Overhangs that are above cane sweep height may protrude 4 inches without being hazardous. Objects within the sweep of canes (at or below 27 inches) or above 80 inches can protrude any amount.

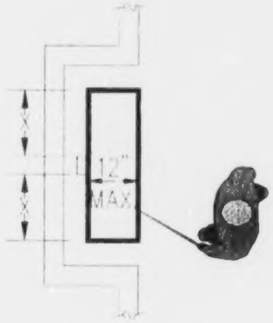


Wing walls, side partitions, and alcoves or recesses can be used for elements such as drinking fountains with their bottom edges above 27 inches. Fixed elements or barriers can provide detection below objects not required to have knee or toe clearance.

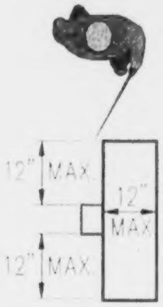
Free-standing and Post-mounted Objects

Where objects are mounted above 27 inches from the ground or floor, overhangs are limited to 12 inches. This is based on standard measures for cane sweep. Objects with leading edges at or below 27 inches or above 80 inches can protrude any amount.

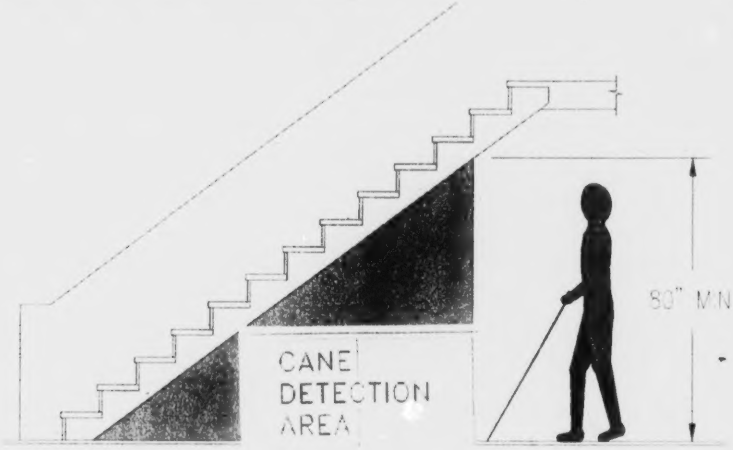




X NOT SPECIFIED: OBJECT CAN PROTRUDE ANY AMOUNT BECAUSE IT CANNOT BE APPROACHED FROM THIS DIRECTION



Head Room [4.4.2]
Circulation paths must provide at least 80 inches of vertical clearance. Otherwise, fixed barriers detectable by canes must define areas with less clearance. Gates, rails, curbs, and other fixed elements, such as planters, can serve as barriers. This is important at open stairways and along sloped walls.



Ground and Floor Surfaces [4.5]

Scoping [4.1.2(4), 4.1.3(3)]

Requirements in 4.5 apply to accessible routes and spaces, including ramps, elevators, platform lifts, and clear floor space. These requirements apply to interior and exterior accessible routes and spaces.

General [4.5.1]

Many variables affect the performance of a given walking surface, including slope and cross slope, its material, jointing, texture, and finish, the presence of moisture or contaminants, the material that contacts it and the method of ambulation. Design guidelines cannot encompass all criteria contributing to the safety of a walking surface. ADAAG addresses surface material, texture, and finish and requires them to be "stable," "firm," and "slip-resistant." No standard or method of measurement exists for these characteristics except for slip-resistance.

A "stable" surface is one that is not permanently changed by ordinary contaminants or applied force so that when a contaminant or force is removed, the surface returns to its original condition under normal use. A "firm" surface is resistant to deformation by indentations or particles moving on or across it.

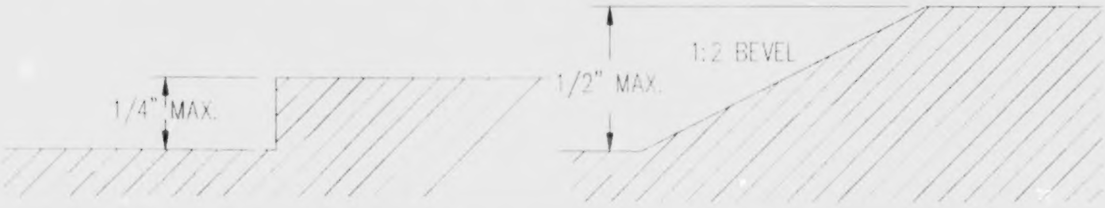
Slip-resistance is based on the frictional force necessary to keep a shoe heel or crutch tip from slipping on a walking surface under conditions likely to be found on the surface. The static coefficient of friction provides a close approximation of a surface's slip-resistance. ADAAG does not require compliance with a specified level of slip-resistance since the static coefficient of friction, which can be measured in several ways, varies according to the measuring method used. (Recommended levels in the ADAAG appendix of 0.6 for level surfaces and 0.8 for ramps are advisory, not mandatory). Affected industries (floor finishes, ceramic tile, and plumbing fixtures) each employ a different testing method in designating the slip-resistance of their products. In the absence of any specified means of measuring slip-resistance, materials and products can be specified according to the values determined within the industry. ADAAG is not interpreted as prohibiting use of specific materials since texturing or other treatments may sufficiently enhance slip-resistance, though some alternatives, such as applied surfaces, will require greater maintenance (reapplication) than others. *Recommendation:* Slip-resistance should be specified according to the conditions likely to be found on the surface. Exterior routes and spaces that are not protected, lobbies and entrances, bathing facilities and other areas where floor surfaces are often wet, should have a higher level of slip-resistance.

Exterior Surfaces

Materials such as gravel, wood chips, or sand which are often used for outdoor walkways are neither firm or stable nor are they generally considered slip-resistant. However, some natural surfaces, such as compacted earth, soil treated with consolidants, or materials stabilized and retained by permanent or temporary geotextiles (mesh), gridforms, or similar construction may perform satisfactorily for persons using wheelchairs and walking aids.

Changes in Level [4.5.2]

Vertical changes in level up to ¼ inch are permitted without treatment along accessible routes. Changes in level ¼ to ½ inch must be beveled with a slope no greater than 1:2. Changes in level greater than ½ inch where the slope is more than 5% must be treated as a curb ramp [4.7] or ramp [4.8].



Carpet [4.5.3]

Carpeting can significantly increase the amount of force needed to propel a wheelchair over a surface. Studies show that the level of roll resistance of carpet, even low-pile carpet that is properly secured, is considerably higher than the roll resistance of firmer surfaces such as concrete and linoleum. The firmer the carpeting (and backing), the lower the roll resistance. A pile thickness up to ½ inch (measured to the backing, cushion, or pad) is allowed, although a lower pile provides easier wheelchair maneuvering. If a backing, cushion or pad is used, it must be firm. *Recommendation:* Preferably, carpet pad should not be used because the soft padding increases roll resistance.

There should be minimum movement, none if possible, between the cushion or pad and the carpet. In high traffic areas, where this attachment may loosen or where a thick soft (plush) cushion or pad is used, wheelchair travel can become very difficult. Secure attachment to the floor is important to prevent buckling or warping. Trim is required along the full length of any exposed edges. This helps keep carpet from curling which can pose a tripping hazard and make wheelchair traffic difficult. The trim must meet requirements for changes in level.

Mats

Recommendation: ADAAG does not contain provisions for carpet that is not permanently fixed, such as matting placed in lobbies during inclement weather. Where used, it is recommended that they meet the pile height and trim requirements for fixed carpeting, have firm tapered edges for smooth transitions, be firm enough to minimize buckling or rolling and have an underside material or texture that grips the floor.

Gratings [4.5.4]

Gratings can pose a hazard by catching or entrapping the tips of crutches and walkers or narrow wheels of a wheelchair. The spacing between grates and orientation to the direction of travel can reduce these risks. ADAAG requires a maximum opening dimension of ½ inch in one direction and that elongated openings be placed so that the long dimension is perpendicular to the dominant direction of travel. These requirements apply to gratings located in any walking surface, including courtyards and plazas, not just those on accessible routes.

Recommendation: ADAAG does not specifically address other types of openings or gaps in ground or floor surfaces, such as those between pavers or at expansion joints. Irregular paved surfaces where joint surfaces may be recessed below the level of the paving unit can disrupt wheelchair maneuvering even if the differences in level are less than ¼ inch. The ½ inch horizontal maximum specified for gratings is a good rule of thumb for these openings as well. Gaps or openings wider than ½ inch should be avoided or else treated, especially where they run parallel to a direction of travel.

Parking and Passenger Loading Zones [4.6]

Accessible parking and passenger loading zones require aisles alongside parking and pull-up spaces so that persons using mobility aids can transfer and maneuver to and from vehicles. Wider aisles are necessary to accommodate vans equipped with lifts, which are often mounted on the side but sometimes the back. Accessibility also includes the appropriate designation and location of spaces and passenger loading zones, their connection to an accessible route, and vertical clearance for vans.

Scoping [4.1.2(5)]

Accessible spaces are required for visitor and employee lots according to the number provided in each lot. On sites with multiple lots, this number is still calculated lot-by-lot, even where accessible spaces required for one lot are located in another. Standard spaces must have an access aisle at least 5 feet wide, while those that provide van access must have an access aisle at least 8 feet wide.

Lot Total	Minimum Accessible			Lot Total	Minimum Accessible		
	stand.	van	total		stand.	van	total
1 - 25	0	1	1	651 - 700	12	2	14
26 - 50	1	1	2	701 - 750	13	2	15
51 - 75	2	1	3	751 - 800	14	2	16
76 - 100	3	1	4	801 - 850	14	3	17
101 - 150	4	1	5	851 - 900	15	3	18
151 -200	5	1	6	901 - 950	16	3	19
201 - 300	6	1	7	951 - 1000	17	3	20
301 - 400	7	1	8	1001 - 1100	18	3	21
401 - 500	7	2	9	1101 - 1200	19	3	22
501 - 550	9	2	11	1201 - 1300	20	3	23
551 - 600	10	2	12	1301 - 1400	21	3	24
601 - 650	11	2	13	1401 - 1500	21	4	25

Van Spaces

Vans with lifts are popular among people who use wheelchairs because they can eliminate the need to transfer from mobility aids. At least one of every eight accessible spaces must be van-accessible. Their use however is not restricted to vans only. The number of van spaces is based on the total number of accessible spaces provided in a lot. *Recommendation:* Where accessible spaces are dispersed within a lot, consider providing van access at each location. Since spaces can share an aisle, two van spaces can be provided instead of one without any space impact.

Leased/ Assigned Parking

Lots with assigned or leased spaces are not exempt from the requirement for accessible parking. Use of accessible spaces by people without disabilities may be possible so long as access is not denied to people with disabilities as needed.

Alterations

In alterations, the minimum number is based on the total number of spaces altered or added to a lot. *Recommendation:* Where a lot is not fully altered, it is recommended that the minimum number of spaces required in new construction for the entire lot be provided where the scope of work provides this opportunity. Normal maintenance is not considered an alteration unless the usability of lots or spaces is affected. For example, where a lot is resurfaced or its plan reconfigured, accessible spaces are required. Maintenance not affecting the usability of spaces, such as repainting existing striping or repairing potholes, does not trigger compliance. Full compliance is required unless it is technically infeasible, such as when providing the required number of accessible spaces will reduce the total below the number required by a local zoning or land use code. In this case, the number of accessible spaces that can be provided is required. (Many zoning boards are willing to grant limited waivers on the total number of required spaces for this purpose.)

Medical Care and Other Services for Persons with Mobility Impairments

Greater access is required at outpatient facilities (10%) and those that specialize in serving people with mobility impairments (20%) since the need for accessible parking is usually greater at these types of facilities. This is intended to apply to visitor or patient parking. *Recommendation:* If a lot serves more than one facility or portions of a facility not subject to this higher scoping, a local zoning code or other method can be used to determine the number of spaces that "belong" to each one, usually by square footage, occupant load, and occupancy type. For example, if a lot generally serves a hospital with an outpatient unit, the 10% requirement can be applied to the number of spaces determined for the outpatient unit and the basic scoping of the table applied to the remainder.

Outpatient Facilities

The term "outpatient facility" is not defined in ADAAG but is intended to cover facilities or units that provide regular and continuing medical treatment without an overnight stay which are located in "medical care facilities" (i.e., where the period of stay may exceed 24 hours and persons may need assistance in responding to an emergency). Examples include a hospital's clinic or ambulatory care center. Doctors' offices, independent clinics, or other facilities not located in "medical care facilities" (as defined in ADAAG) are not considered outpatient facilities.

Facilities Specializing in Services for Persons with Mobility Impairments

The 20% scoping applies to facilities or units that specialize in providing services to people with "mobility impairments," which may include:

- conditions requiring the use or assistance of a brace, cane, crutch, prosthetic device, wheelchair, or powered mobility aid
- arthritic, neurological, or orthopedic conditions that severely limit one's ability to walk
- respiratory diseases and other conditions which may require the use of portable oxygen
- cardiac conditions that impose significant functional limitations

Examples include spinal cord injury treatment centers, prosthetic and orthotic retail establishments, and vocational rehabilitation centers for persons with mobility impairments. This provision does not apply to facilities that provide but do not specialize in these services, such as general rehabilitative counseling or physical therapy centers. In determining whether a facility is subject to this requirement, both the nature of the services or treatment provided and the population served should be considered.

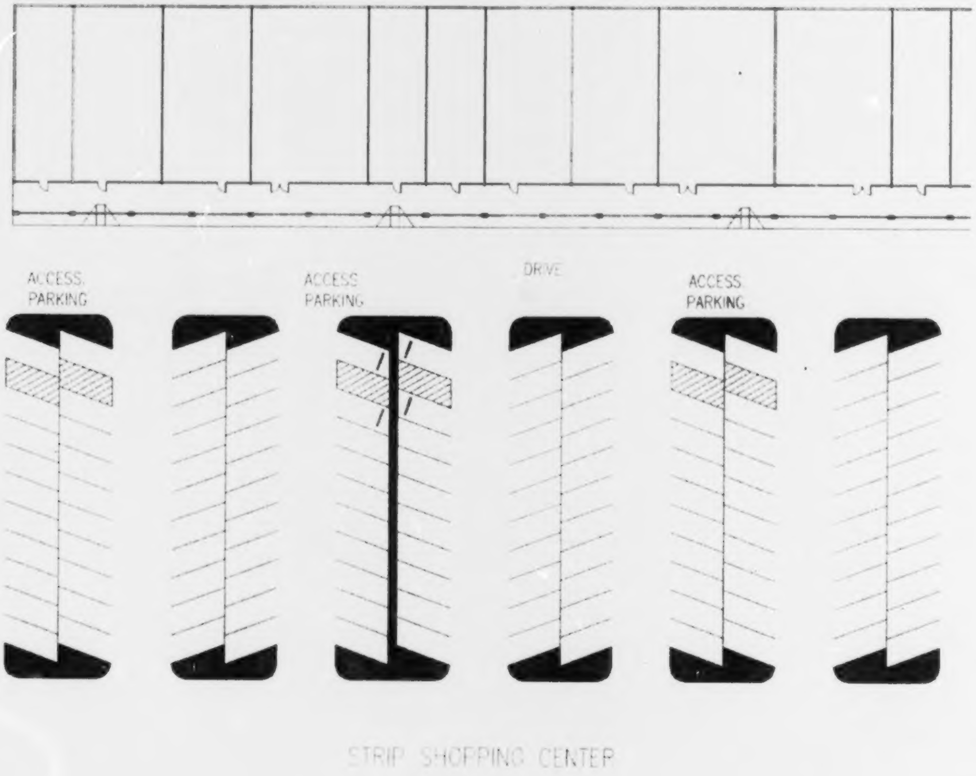
Valet Parking

Where only valet parking is provided, an accessible passenger loading zone is required. *Recommendation:* Provision of accessible parking spaces, though not required, is strongly encouraged. Parking attendants may not be able to operate vehicles that are specially adapted for drivers with disabilities, such as full hand control operation and removed driver seats. Also, valet service may not be available during all hours of building operation or may be discontinued. Where valet service is optional or intermittent, accessible spaces should be provided in addition to the accessible passenger loading zones.

Location [4.6.2] and Dispersion

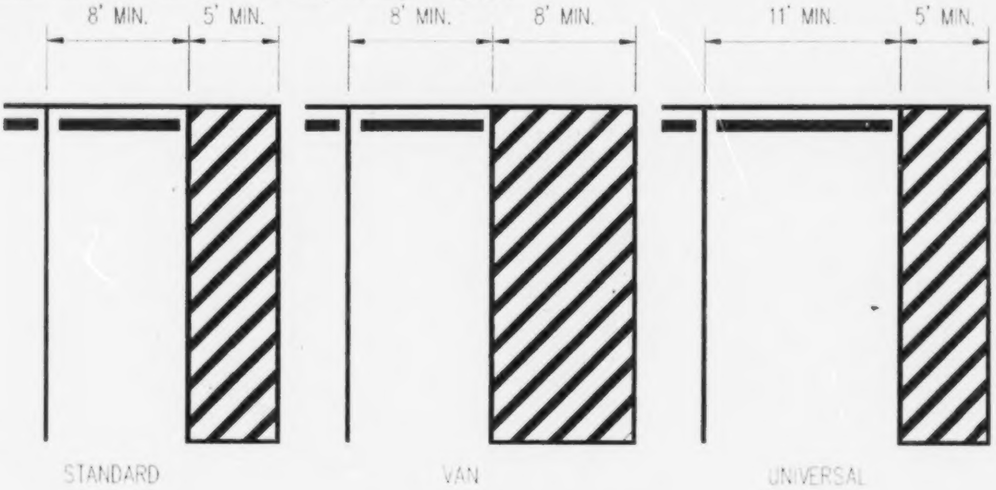
Accessible spaces required for one lot can be located in another where equal or greater access is achieved. For example, spaces for an out-lying lot can be placed in a lot closer to the building served since accessible spaces must be located on the shortest accessible route to an accessible facility entrance. *Recommendation:* Accessible routes that cross vehicular ways should be marked as a crossing. Since people who use wheelchairs may not be as visible from a vehicle, it is recommended that accessible routes be configured to prevent or minimize wheelchair travel behind parked vehicles.

Accessible parking must be dispersed at buildings with multiple accessible entrances (especially important at large facilities such as malls and airports) and should be dispersed among multiple buildings on the same site even where lots are shared. In the case of strip shopping centers, however, accessible spaces are not required at each tenancy entrance, but should be dispersed to minimize travel distances.



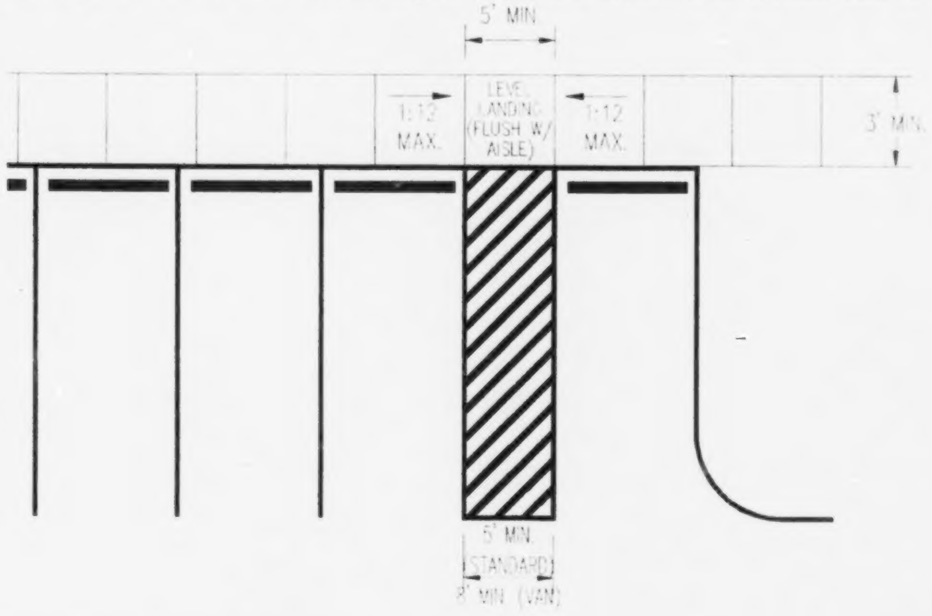
Parking Spaces [4.6.3]

For vans with side-mounted lifts, a combined width of almost 17 feet is often needed for the deployment and use of side-mounted lifts; ADAAG requires at least 16 feet. "Universal" parking spaces can be provided instead of separate standard and van spaces; (designated van spaces are not required under this design). Universal spaces are wider so that users can park to one side or the other as needed, including car drivers. The length of accessible spaces is not specified. Access aisles must be as long as the parking space.


8' MIN.
5' MIN.
8' MIN.
8' MIN.
11' MIN.
5' MIN.
STANDARD
VAN
UNIVERSAL

NOTE: TWO SPACES CAN SHARE ONE AISLE

A maximum slope of 2% is required in all directions for both the space and access aisle since level surfaces are important for wheelchair transfer to and from vehicles. For this reason, built-up curb ramps cannot project into access aisles. *Recommendation:* Connecting accessible routes should be configured so that people using wheelchairs, who may not be as visible to drivers backing out of spaces, do not have to travel behind other vehicles.


5' MIN
1:12 MAX.
LEVEL LANDING (FLUSH W/ AISLE)
1:12 MAX.
3' MIN.
5' MIN. (STANDARD)
8' MIN (VAN)

Signage [4.6.4]

Accessible spaces must be designated by the access symbol, which can be mounted on walls, posts, or from garage ceilings so that it is not obscured by vehicles parked in the space. *Recommendation:* Since traffic codes often govern sign height, ADAAG does not specify a height for parking signs. A height of at least 60 inches (measured to the bottom edge) is generally advisable (taking care not to make the sign a protruding object), although a higher height is better for signs at van spaces.

ADAAG specifies the sign content and symbol/field contrast (light-on-dark or dark-on-light), but not the color or size, which may be addressed by local jurisdictions. The "Van-Accessible" designation is meant to be informative, not restrictive, in the use of van spaces. Additional signage can clarify this, which may be important in lots with only one accessible space since that space must be a van space.

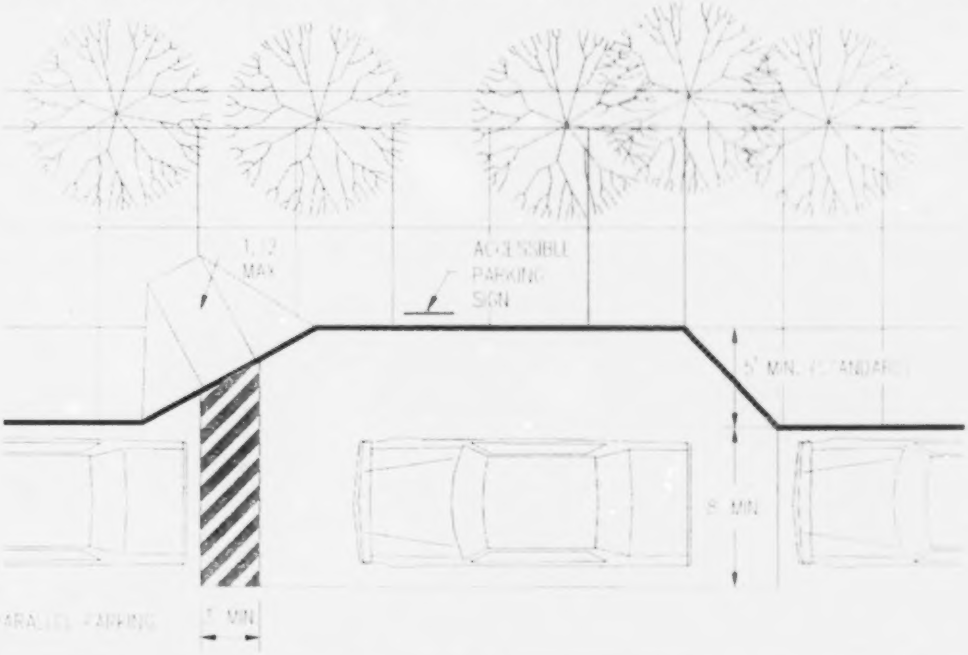
The method and color of striping is not specified in ADAAG but may be addressed by local code. Access symbols on the parking surface, sometimes required locally, are obscured by vehicles parked in the space and cannot substitute for post- or wall-mounted signage. Since van access aisles can be as wide as spaces, it is important that they be clearly marked (diagonal striping is often used). Bollards or other barriers can help prevent misuse of the aisle as a space provided that they do not obstruct the connecting accessible route.

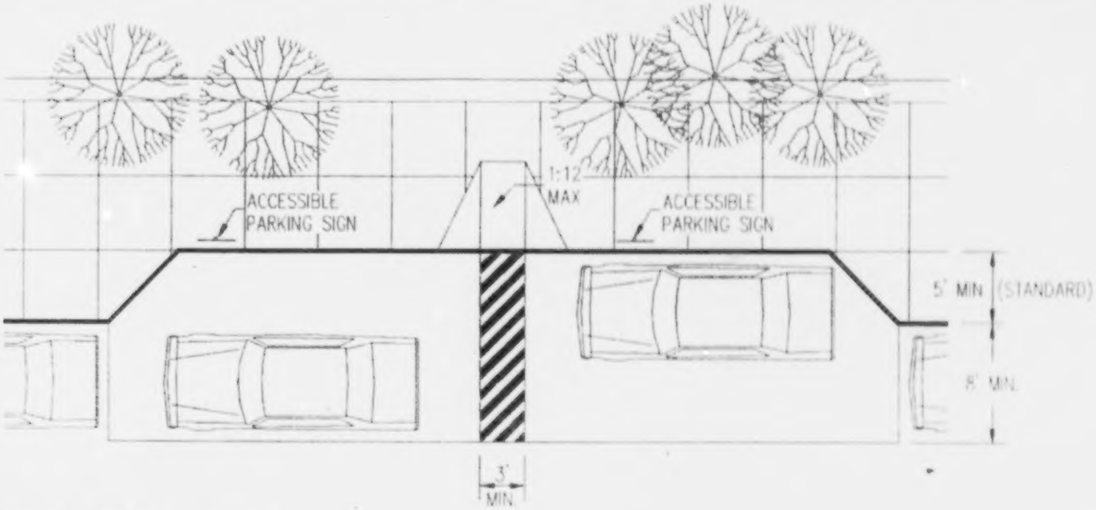
Vertical Clearance [4.6.5]

Vertical clearance of at least 98 inches is based on the height necessary for personally-owned vans. (A higher clearance (114 inches) is required for passenger loading zones to accommodate other types of transit vehicles, including vans used for shuttle service). In garages, at least one vehicular route connecting van spaces to entrances and exits must provide this clearance; van spaces can be clustered on one level. *Recommendation:* Directional signage, including that at entrances, can be very helpful, especially where van spaces are located in one area only.

On-Street Parking

Although ADAAG does not specifically address on-street parking, local jurisdictions may choose to provide accessible on-street parking. The following designs show on-street spaces that are accessible according to ADAAG.





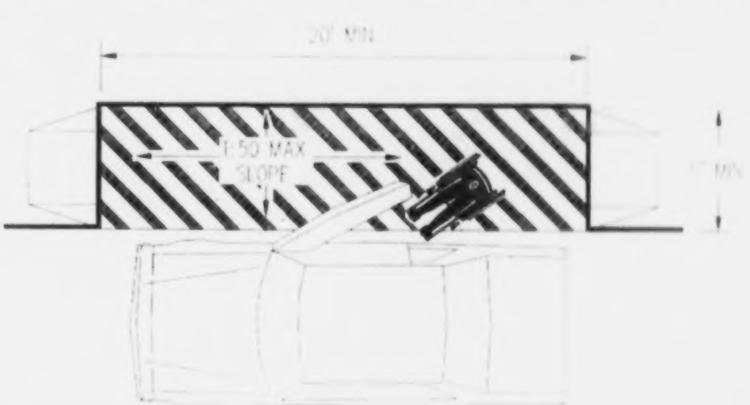
Angled (Front-In) Parking

ADAAG's requirement for an access aisle on either side of a space (they can be shared by two spaces) is based on the assumption that drivers can head in or back in as needed. While not specifically addressed in ADAAG, spaces that allow only head-in parking do not afford this same level of flexibility. *Recommendation:* Where possible, locate accessible spaces in areas where drivers have the option of backing in or consider providing an access aisle at each space so that in series an aisle is available on both sides, thereby allowing use of an aisle on both the driver and passenger sides.

Passenger Loading Zones [4.6.6]

Where zones are specifically designed for passenger loading and unloading, at least one on a site must be accessible. *Recommendation:* In practice however, particularly at large facilities such as airports and university campuses (which may be served by shuttles), it is recommended that passenger loading zones serving all accessible entrances be accessible.

Aisles must be at least 5 feet wide, although a wider aisle (8 feet wide minimum) is helpful at zones that serve transit vehicles with lifts or ramps. A level surface (maximum 2% slope in any direction) for both the space and aisle is important for wheelchair transfer to and from vehicles and deployment of vehicle lifts or ramps. Where aisles are flush with the pull-up space, wheelchair transfer is easier (the change in level of aisles at curb height can make transfer very difficult).



Vertical Clearance

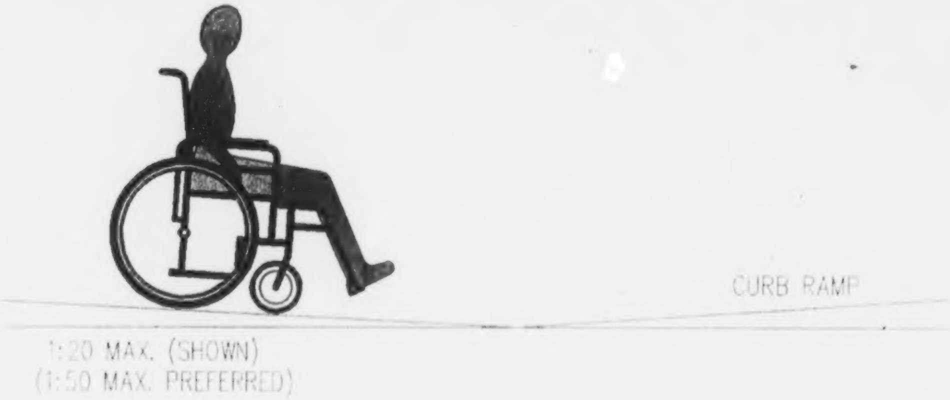
A minimum vertical clearance of 114 inches is required at passenger loading zones and along at least one vehicular route connecting accessible loading zones with site entrance and exits. This clearance is greater than the vertical clearance required for van parking since some loading zones serve transit vehicles, such as shuttle vans, that have a higher roof.

Curb Ramps [4.7]

Curb ramps complying with 4.7 are required wherever an accessible route crosses a curb.

Slope [4.7.2]

The running slope of curb ramps cannot exceed 1:12. In alterations where it is technically infeasible to meet new construction requirements, curb ramps may have a maximum slope of 1:10 if the rise does not exceed 6 inches. It is important that transitions to curb ramps be flush. Lips at the bottom of ramps, a common complaint, impede the momentum needed to propel a wheelchair up-slope. Severe counter slopes can do the same thing and cause footrests to scrape. *Recommendation:* While a 5% adjoining slope is allowed for drainage, gutters, and roadway crowns, this slope should be minimized wherever possible (a maximum 2% slope is preferred).

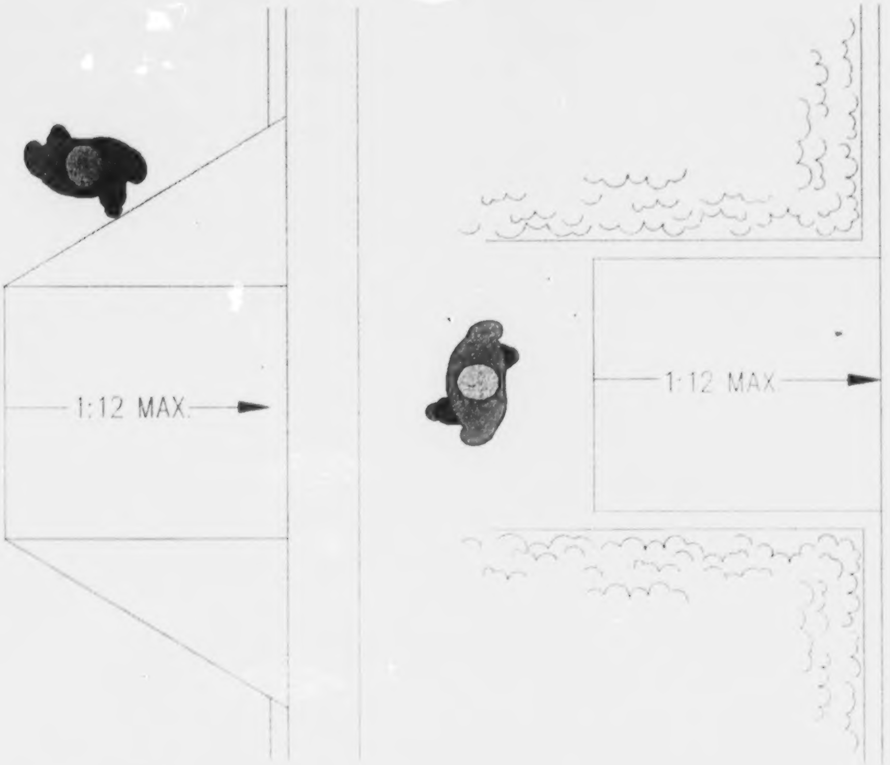


Width [4.7.3] and Surface [4.7.4]

The minimum clear width of a curb ramp is 36 inches, exclusive of flared sides. Curb ramp surfaces, including flared sides, must comply with requirements in 4.5 for ground and floor surfaces which must be "stable, firm, and slip-resistant." The cross-slope of the curb ramp (2% maximum) must be minimized because it makes wheelchair travel difficult by distributing weight and required force to one side and causing front casters to veer.

Sides of Curb Ramps [4.7.5]

Where pedestrians cross the ramp, curb ramps are required to have side flares; sharp returns present tripping hazards. Returned curbs are acceptable where pedestrian traffic across the ramp is discouraged.



Built-up Curb Ramps [4.7.6]

Built-up curb ramps are permitted where they do not project into vehicular traffic lanes or access aisles at parking spaces and passenger loading zones. (The surface of access aisles cannot slope more than 2% in any direction). *Recommendation:* Curb ramps with returned sides or concave flares are preferred over built-up curb ramps with convex flares because they provide greater edge protection.

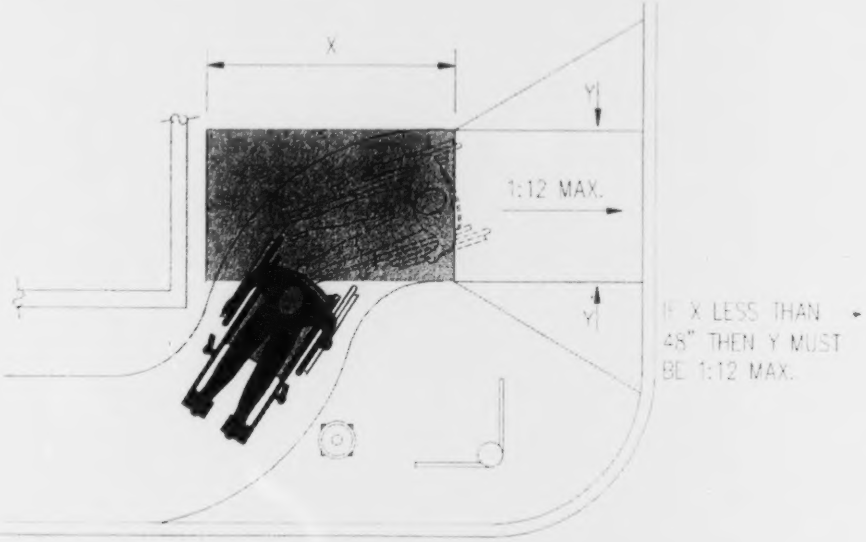
Detectable Warnings [4.7.7]

The edges of curbs can provide a cue to people with vision impairments. Since curb ramps remove this detectable drop-off, ADAAG originally required a distinctive dome patterning for the surface of curb ramps detectable by canes or by foot so that people with vision impairments could detect the transition from pedestrian area to street. In response to business and user concerns about the need and specifications for this detectable warning, this requirement was suspended in 1994 pending further study. Alternative means of providing a tactile warning at curb ramps that empty into streets may be acceptable (though not required) until a requirement may be established. Jurisdictions may continue to install the truncated domes specified in ADAAG or other surfaces or technologies if they wish but are not obligated to do so.

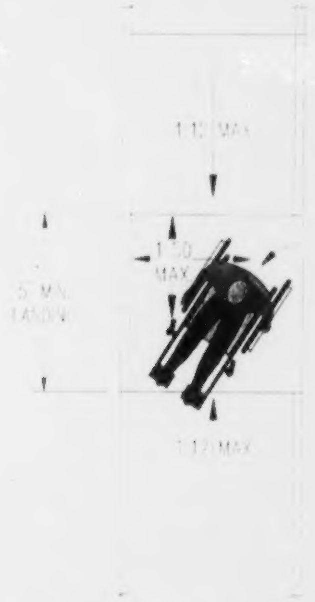
Obstructions [4.7.8]

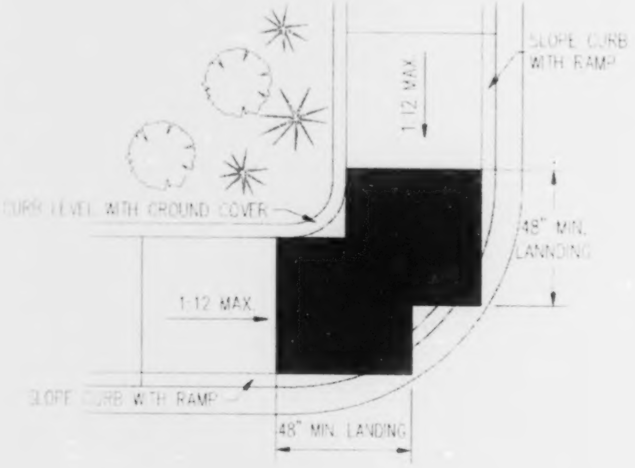
It is important that parked cars, lampposts, utility poles, and other elements placed along sidewalks not obstruct connecting accessible routes.

Space is needed at the top and bottom of ramps so that people using wheelchairs can align with the running slope and maneuver from ramps, including when making turns (which is difficult on sloped surfaces). At curb ramps, a landing provides the necessary connection to an accessible route. A landing with a minimum length of 48 inches will provide sufficient turning space. Where space at the top is less than 48 inches, side flares must have a maximum slope of 1:12 instead of 1:10 at the curb face.


X
Y
1:12 MAX.
Y
IF X LESS THAN 48" THEN Y MUST BE 1:12 MAX.

Alternative designs can provide sufficient landings at ramps where space is limited, including at intersections. Perpendicular ramps that are offset from the intersection can provide level landings at the top and bottom of ramps.


1:12 MAX
1:50 MAX
5' MIN. LANDING
1:12 MAX

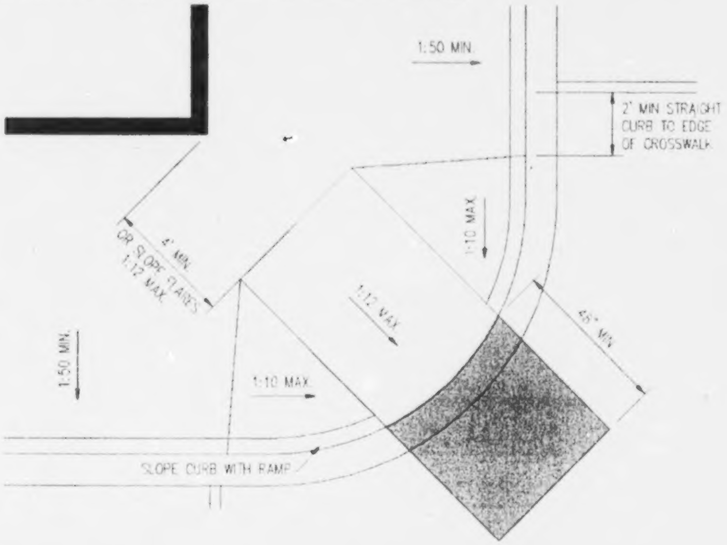

SLOPE CURB WITH RAMP
1:12 MAX.
CURB LEVEL WITH GROUND COVER
48" MIN. LANDING
1:12 MAX.
SLOPE CURB WITH RAMP
48" MIN. LANDING

Location at Marked Crossings [4.7.9]

The foot of a curb ramp must be contained within the crosswalk, where one is marked. At corners with a large radius, perpendicular curb ramps should be located so that the centerline is radial to the curb face instead of being in line with the crosswalk direction.

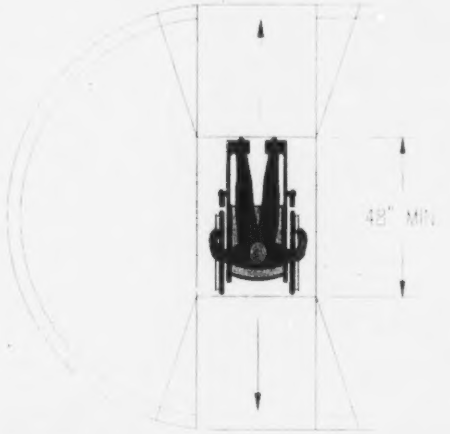
Diagonal Curb Ramps [4.7.10]

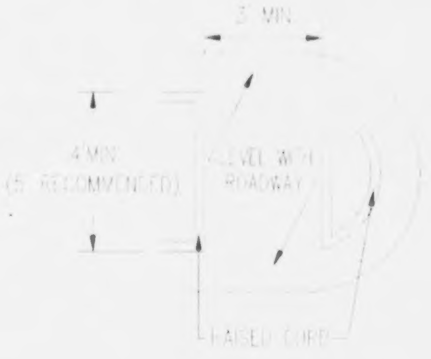
People using wheelchairs should not be directed into an active travel lane in order to cross stopped traffic. A landing at least 48 inches long must be provided outside the through-travel lanes if a diagonal ramp is used. Otherwise, perpendicular curb ramps should be used. In addition, a segment of straight curb at least 2 feet long must be provided on each side of the curb ramp and within the marked crossing.


1:50 MIN.
2' MIN STRAIGHT CURB TO EDGE OF CROSSWALK
1:10 MAX.
4' MIN.
OR SLOPE FLARES 1:12 MAX.
1:12 MAX.
48" MIN.
1:50 MIN.
1:10 MAX.
SLOPE CURB WITH RAMP

Islands [4.7.11]

At traffic islands, wheelchair space between opposing ramps is essential. If there is no level space between ramps, wheelchairs can "bottom out" or "high center" while proceeding down one ramp while the back wheels are coming up the other slope. Cut-through routes level with the street are necessary where wheelchair space between opposing ramps is not available. Islands with cut-through routes must be wide enough (48 inches minimum) to provide space for a person using a wheelchair.




3' MIN.
4' MIN
(5' RECOMMENDED)
LEVEL WITH ROADWAY
RAISED CURB

Ramps [4.8]

Where the running slope of an accessible route is more than 5%, it is considered a ramp. Generally, changes in level up to 6 inches can be treated as a curb ramp.

Curved ramps, while not specifically addressed by ADAAG, are not considered suitable for wheelchair traffic unless the radius of curvature is large enough. The curvature and slope typically result in an uneven surface that makes wheelchair maneuvering difficult because not all wheels rest on the surface. An inner radius of curvature over 30 feet is considered necessary in order to minimize the slope differential.

Slope and Rise [4.8.2]

Slope represents the proportion of vertical rise to horizontal length and can be represented as a ratio (as in ADAAG), percentage, pitch or in degrees.

rise:length	percent	pitch	degree
1:8	12.50%	.1250	7.13
1:10	10%	.1000	5.71
1:12	8.33%	.0833	4.76
1:13	7.69%	.0769	4.40
1:14	7.14%	.0714	4.09
1:15	6.67%	.0667	3.81
1:16	6.25%	.0625	3.58
1:17	5.88%	.0588	3.37
1:18	5.55%	.0555	3.18
1:19	5.26%	.0526	3.01
1:20	5.00%	.0500	2.86
1:50	2.00%	.0200	1.15

Slope and length greatly determine a ramp's usability. There are trade-offs between the two: a steeper slope makes the run shorter, while a more gradual slope increases the length. A maximum slope of 1:12 is specified although ADAAG calls for the "least possible" slope to encourage more gradual slopes which better serve children and people with limited stamina or upper body strength. A recent study by the Access Board ("Technical Requirements for Ramps" (1996) by the Center for Accessible Housing) indicates a significant increase in exertion occurs on ramps with slopes 1:14 or steeper. *Recommendations:* Consider slopes between 1:16 and 1:20 as preferred, especially at ramps with long runs. The slope should be consistent along the full length of the run. Variation above regular construction tolerances can be disruptive to wheelchair travel, especially in the ascent direction.

Alterations/ Historic Preservation

Steeper slopes are allowed for short ramps where a 1:12 slope is not technically feasible.

Scope	Max. Rise	Max. Slope
altered facilities (including historic)	3 in.	1:8
altered facilities (including historic)	6 in.	1:10
qualified historic structures only	4 in.	1:6

Rise

The maximum length of a run is determined by the rise (30 inches maximum) and the slope:

Max. Rise	Slope	Max. Length	Max. Rise	Slope	Max. Length
30 in.	1:12	30 ft.	30 in.	1:16	40 ft.
30 in.	1:13	32.5 ft.	30 in.	1:17	42.5 ft.
30 in.	1:14	35 ft.	30 in.	1:18	45 ft.
30 in.	1:15	37.5 ft.	30 in.	1:19	47.5 ft.

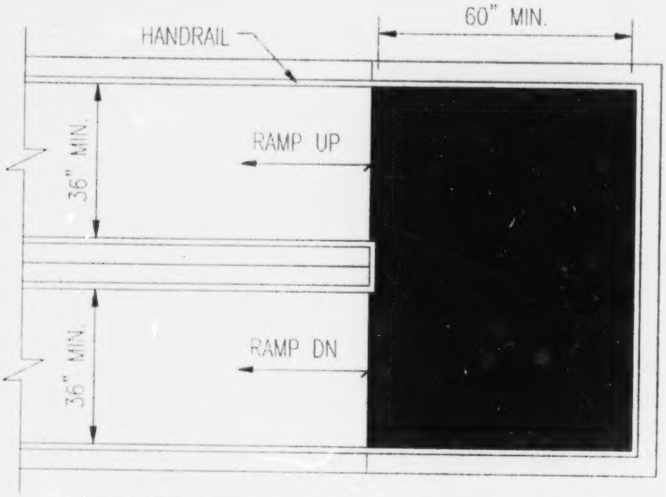
The number of runs per ramp is not limited although the more runs a ramp has the less usable it is. While intermediate landings offer resting points, they do not reduce the amount of force people using wheelchairs must exert traveling up ramps.

Clear Width [4.8.3]

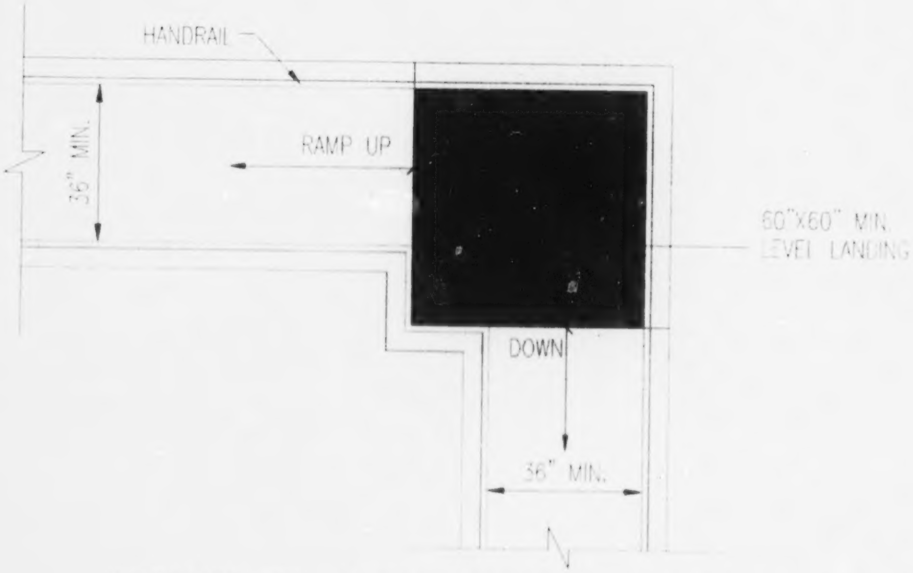
The minimum clear width for ramps of 36 inches is measured between the leading edge of handrails. A maximum clear width is not specified. *Recommendation:* It is often advisable that ramps be wider than the minimum required where usage of the ramp may be subject to appreciable pedestrian traffic.

Landings [4.8.4]

Landings at the top and bottom and intermediate landings, must be at least 60 inches long so maneuvering space is available for approaching ramps straight on. Landings must be at least as wide as the ramp they serve and cannot slope more than 2% in any direction. Where ramps change direction, the landing must be at least 60 by 60 inches. This applies to switchback ramps, ramps with a 90 degree turn, and angled ramps. *Recommendation:* Ramps and landings should be configured to facilitate maneuvering. For example, runs should be aligned along the outside landing edge, as in the case of ramps with a 90 degree turn, so that a wider turn is permitted. Handrail extensions can wrap around landings. It is recommended that landings of exterior ramps be drained so that water does not accumulate on the surface.



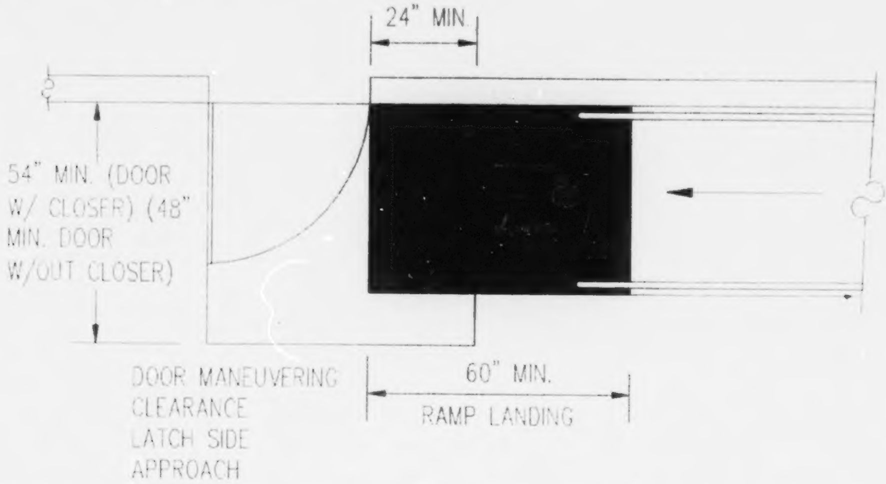
INTERMEDIATE LANDING: SWITCH BACK



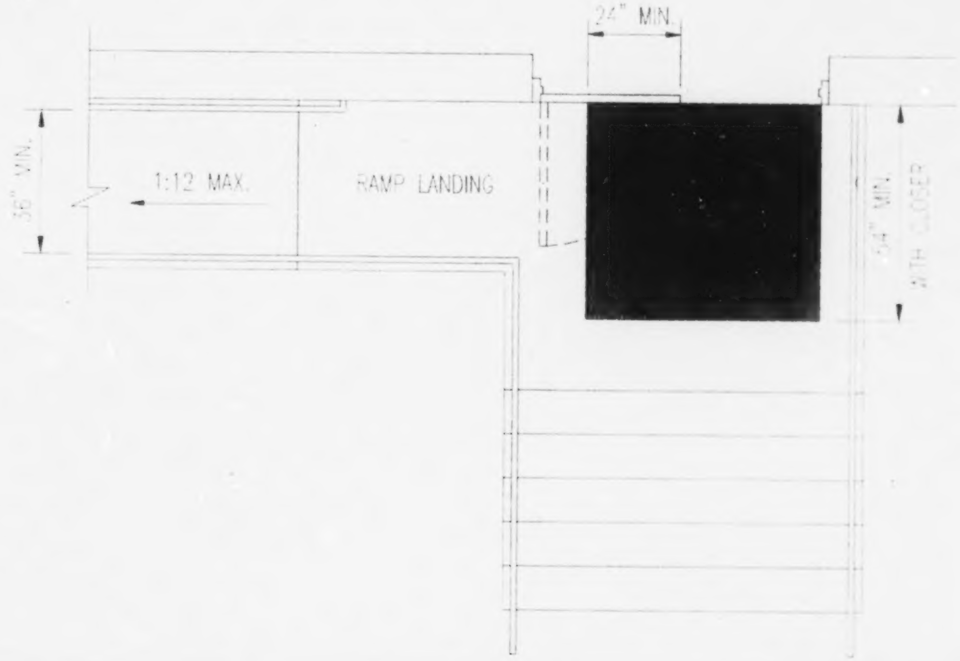
INTERMEDIATE LANDING: ALIGN OUTSIDE EDGE

Doorways [4.8.4]

Landings must provide the maneuvering clearance at doors required in ADAAG 4.13. ADAAG allows the landing to overlap maneuvering clearances at doors. *Recommendation:* Ramps and doors should be configured to facilitate wheelchair maneuvering and to prevent open doors from obstructing ramp openings (important along egress routes). Keeping the door swing clear of minimum landing dimensions is a good idea, especially at the bottom of ramps since people using wheelchairs may exit them with some force and speed.


24" MIN.
54" MIN. (DOOR W/ CLOSER) (48" MIN. DOOR W/OUT CLOSER)
DOOR MANEUVERING CLEARANCE LATCH SIDE APPROACH
60" MIN.
RAMP LANDING

Recommendation: Stairs that open onto ramp landings should be configured so that a person using a wheelchair is not required to maneuver close to the stair opening. Consider allowing additional space beyond the minimum maneuvering clearance required at doors and/or locating stair openings away from the accessible route connecting doors and ramps.


24" MIN.
36" MIN.
1:12 MAX.
RAMP LANDING
54" MIN. WITH CLOSER

Handrails [4.8.5]

Handrails are required on both sides for ramps with a rise more than 6 inches or a horizontal length more than 72 inches. They are not required along ramps adjacent to seating in assembly areas.

ADAAG shows a diameter of 1¼ to 1½ inch for handrails. A standard IPS pipe designated as 1¼ to 1½ inch is acceptable. Since 1½ inch pipe has an outside diameter close to 2 inches, it is important that handrails mounted to walls still provide the 1½ inch (absolute) knuckle clearance. This clearance allows space for knuckles while preventing entrapment for people who lean on rails with their forearm. Handrails can be mounted to guardrails or on top of walls consistent with ADAAG specifications. The height of a guardrail (to prevent falling off the edge) is not specified by ADAAG; local building codes do, however, commonly regulate the minimum height of a guardrail at 42 inches. Because, in ADAAG, the maximum height of a handrail is 38 inches, a handrail must be installed in addition to the guardrail.

Extensions

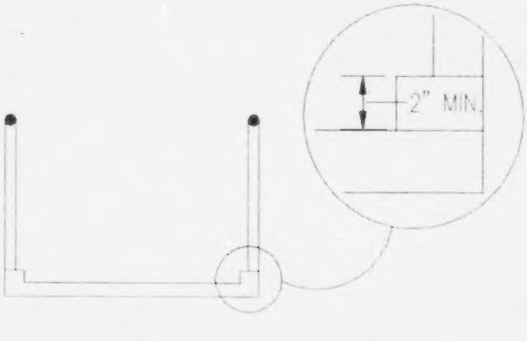
Handrails that are not continuous must have horizontal exstensions at both the top and bottom of the ramp at least 12 inches long that are rounded or returned smoothly to walls, posts, or floors. Inner handrails on switchback ramps must be continuous. Handrail extensions are required on all new ramps but need not project into perpendicular circulation paths in alterations. ADAAG (Figure 17) illustrates returns to post that comply as protruding objects.

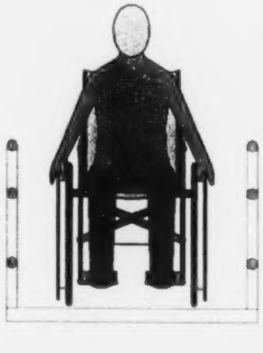
Cross Slope and Surfaces [4.8.6]

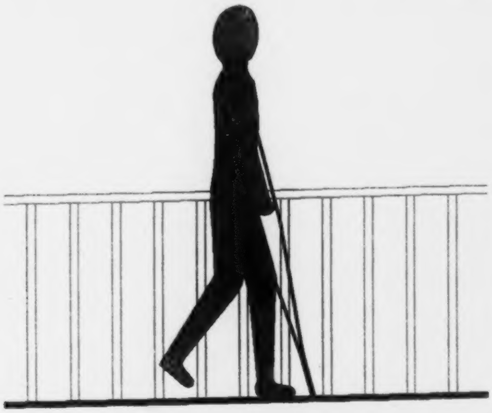
The cross slope (2% maximum) must be minimized because it makes wheelchair travel difficult by distributing more weight and required force to one side and causing front casters to veer. Ramp surfaces must comply with requirements for ground and floor surfaces and be "stable, firm, and slip-resistant." A specific level of slip-resistance is not mandated. It is difficult to categorize various materials as acceptable or unacceptable since surface treatments (texturing and applied coatings) can make a considerable difference. *Recommendation:* It is important that consideration be given to the conditions likely to be found on the surface, such as providing a higher level of slip-resistance on surfaces exposed to moisture.

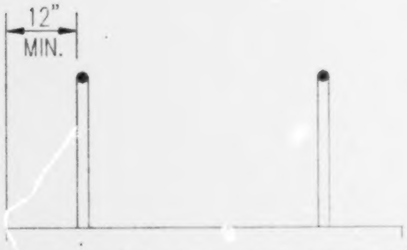
Edge Protection [4.8.7]

Handrails alone do not necessarily provide effective edge protection for people who use wheelchairs, crutches, and other mobility aids. Curbs (or walls) are effective in keeping both wheelchairs and crutch-tips from slipping off the edge or getting caught on vertical posts. Horizontal rails are another alternative although mounting heights are not specified (the 27 inch height in ADAAG Figure 17 pertains to the return of extensions as protruding objects). A rail mounted close enough to the ramp surface to prevent passage of a 4 inch diameter sphere can function like a curb in keeping front casters from getting stuck on vertical posts and crutch-tips from slipping off the edge.









Vertical balusters can be used; intermediate spacing is not specified by ADAAG but is commonly covered by local codes. Curbs, horizontal rails, or extended platforms can help prevent crutch-tips from slipping off the edge between rails. Extended platforms, a permitted alternative, can keep crutch-tips from slipping over the edge (but might not keep wheelchair casters from getting caught on vertical posts unless horizontal or vertical guard rails are also provided).

Outdoor Conditions [4.8.8]
Exterior ramps must be designed so that water does not accumulate on the ramp or landing surface. A slope up to 2% is allowed at landings for adequate drainage. Wetness reduces slip-resistance, which is fully characterized not only by the ramp or floor surface but by the material making contact with it. Puddling that causes shoes, wheels, or crutch tips to become wet will reduce slip-resistance even where the ramp surface is dry. Water accumulation is a particular hazard where it can turn to ice. *Recommendation:* Covering ramps with a canopy or roof is not required but should be considered where wet or snowy conditions are likely.

Stairs 4.9

Scoping [4.1.3(4)]

Specifications in 4.9 benefit people who have difficulty walking or using stairs. Compliance is required where stairs are the only connection between two levels, such as between floors in buildings without elevators. Stairs do not have to comply where vertical access (ramp, elevator, or lift) is provided. In this case, compliance is still a good idea since some people with walking impairments may prefer stairs to ramps or wheelchair lifts. Also, most building codes require stairs to comply with similar requirements. Where compliance is required, 4.9 applies to all stairs between levels not connected by an accessible means.

Accessible Route

Stairs are not considered part of an accessible route but where they are required to comply with 4.9, it is recommended that routes to them meet the requirements for accessible routes since certain specifications, such as clear width, can benefit people with walking impairments able to use stairs and those who use service animals.

Steps

ADAAG does not specify the minimum number of steps that comprise a set of "stairs." Most building codes require handrails for a certain change in level or number of steps. (In new construction, the requirement for accessible routes usually makes compliance with 4.9 optional).

Egress Stairs

The requirement for a minimum 48 inch width between handrails is specific to stairs adjacent to areas of rescue assistance and does not apply generally to stairs covered by 4.9.

Assembly Areas

Because handrails may interfere with egress where they adjoin seating and since accessible routes are required to connect to wheelchair seating locations, compliance with 4.9, including requirements for handrails, is not required at sides of stairs adjacent to seating in assembly areas.

Treads and Risers [4.9.2], Nosings [4.9.3]

Treads must be at least 11 inches wide and uniform. Uniformity is important not only between steps but along each step; curved stairs, where the width of each tread varies, do not meet this requirement. Variation in riser height along a set of stairs can be a tripping hazard. ADAAG requires the height to be uniform but does not specify a minimum or maximum height which is addressed by most local building codes. (The CABO/ANSI A117.1-1992 standard requires a riser height between 4 to 7 inches.)

People without full use of a leg may drag a foot when ascending stairs. A smooth transition from tread to tread is essential. Open risers and abrupt or extended nosings (i.e., projecting more than 1½ inches) can catch the toe. Angled or rounded nosings or sloped risers help prevent this hazard and provide a smoother transition. Straight risers without nosings are acceptable. ADAAG specifies the radius of the curvature of the leading edge of treads and the underside slope of angled or rounded nosings.

Handrails [4.9.4]

Continuous handrails are required along both sides of stairs. A center rail is not specified for wide stairways by ADAAG but may be required by local building or life safety codes.

Shape and Diameter

Use of a handrail requires the formation of a power grip so that hands and fingers can be opposed and the surface of the palm can be in maximum contact with the rail surface. Large sections, particularly those of rectangular design, are not as graspable as smaller circular sections. A gripping surface width between 1¼ to 1½ inches diameter is specified. Also permitted are rails that allow an opposing grip similar to that possible with a circular section of 1¼ to 1½ inch diameter. Standard IPS pipe designated as 1¼ to 1½ inch is acceptable. (Consider a 1¼ inch specification for pipe since a 1½ inch specification may result in an outer diameter close to 2 inches.) The 1½ inch clearance between walls and handrails is an absolute dimension; it provides knuckle clearance while preventing entrapment of the arm for people who lean on rails with their forearm.

Extensions

Extensions at the top provide support before the first step is made. The bottom extension is especially important in providing this support until one is fully vertical. For extensions to provide this support, they must be in line with the direction of travel on the stairs. Extensions are not required in alterations if they project into cross circulation paths. Extensions must be rounded or returned to the walls, floors, or posts. Requirements for protruding objects in 4.4 limit post-mounted overhangs to 12 inches if the leading edge is higher than 27 inches from the floor.

Detectable Warnings at Stairs [4.9.5]

A requirement for detectable warnings has not been specified because of lack of data regarding effectiveness.

Elevators [4.10]

Scoping [4.1.3(5)]

Elevators are required in "multi-story" facilities. There may be more than one floor level, such as a mezzanine, within a "story" but the requirement for an elevator applies to buildings with more than one story. While mezzanines and levels within a story are not counted in determining whether an elevator is required, elevators must serve mezzanines where one is required or provided anyway. Under ADAAG, a floor must contain occupiable space in order to be considered a "story." ADAAG defines "occupiable" in part as "a room or enclosed space designed for human occupancy ... which is equipped with means of egress, light, and ventilation." Thus, if a building has two floors and only one provides any occupiable space, there is no requirement for an elevator.

Exception

While elevators are the primary means of vertical access between floors, an exception is allowed for buildings that have less than three stories or less than 3,000 square feet per floor. Either condition satisfies this exception. Vertical access by other means (ramp or lift) is not required to upper stories in exempt facilities. This exception is not allowed for:

- shopping centers or malls
- professional offices of health care providers
- public transit stations and airport passenger terminals
- state or local government facilities

The Department of Justice (DOJ) title III regulation and technical assistance manual provide important information on this exception, including definitions of these facilities. The DOJ regulation for title II does not permit an exception for state and local government facilities.

Floors above or below the accessible floor in buildings without elevators must still fully comply with ADAAG. This is required for several reasons: some people with mobility impairments can use stairs, ADAAG addresses access for people with hearing or vision impairments as well as mobility impairments, and elevator access may be provided in future alterations or additions. Also, if toilet or bathing facilities are provided on an inaccessible level in a building that qualifies for the elevator exception, then toilet or bathing facilities must be provided on the accessible level as well.

Alterations [4.1.6(1)(f) & (k)]

In alterations, ADAAG does not require a level of access greater than that required in new construction. Thus, the exception from the requirement for an elevator in buildings with less than 3 stories or with less than 3,000 square feet per floor applies to altered facilities as well, including those where an area containing a "primary function" is altered. For those not exempt, ADAAG provides guidance on the type of alterations that may require vertical access between floors: major structural modifications resulting from replacement or addition of stairs or escalators. This guidance is key in determining whether an elevator is required in buildings where an alteration increases the number of stories or square footage per floor above the number recognized by the exception. In a building not exempt from the elevator requirement, vertical access may be required as part of the path of travel to altered primary function areas when the cost is not "disproportionate."

The intended scope of work and technical feasibility are key factors in determining compliance in alterations to existing elevators. For example, if the planned scope of work is limited to replacement of an elevator cab's control panel, then at a minimum the new control panel must comply to the maximum extent feasible. Or, if an alteration involves replacing the cab but not the existing shaft, ADAAG recognizes that meeting the minimum car plan dimensions may not be technically feasible due to the existing shaft configuration; in this case, smaller cab sizes are permitted. Special provisions based on technical infeasiblity for car dimensions and automatic door reopening devices in 4.1.6(3)(c) are further discussed below.

Destination-Oriented Elevators

Destination-oriented elevators are different from typical elevators in that they provide a means of indicating the desired floor at the location of the call button, usually through a key pad, instead of a control panel inside the car. Responding cars are programmed for maximum efficiency by reducing the number of stops any passenger experiences. ADAAG currently does not specifically address this type of elevator, which was not widely in use when ADAAG was first published. However, where provided, destination-oriented elevators must meet the technical requirements in 4.10 as appropriate. For example, ADAAG requires audible and visual car position indicators which typically identify floors as they are passed; with destination-oriented elevators, audible and visual indicators must be provided indicating the car destination both when the car arrives in response to the call and when it arrives at the floor destination.

General [4.10.1]

Elevators must comply with the American Society of Mechanical Engineers (ASME) Safety Code for Elevators and Escalators (ASME A17.1-1990). Freight elevators generally cannot be used as passenger elevators unless the only elevators planned are to be used as combination passenger and freight elevators. Such elevators are covered in the ASME A17.1 code.

Automatic Operation [4.10.2]

The elevator must be automatically operable by the passenger. Self-leveling must correct the overtravel or undertravel of a car as it stops at a landing within a ½ inch vertical tolerance since changes in level greater than ½ inch can be troublesome for someone using a wheelchair.

Hall Call Buttons [4.10.3]

These specifications apply to all hall call buttons provided, including those that serve cars that operate independently from others in the same bank or lobby. *Recommendation:* Buttons that are raised from the faceplate (or trim ring or ferrule) are preferred because they can be activated by other parts of the hand, not just the finger tip. (Buttons can be flush, but not recessed).

Hall Lanterns [4.10.4]

Audible signals serve people with visual impairments by indicating which car is answering the call and its travel direction. Audible signals sound once for the up direction, twice for down. Visual signals provide this information to people who are deaf or hard of hearing. At least one visible signal must serve each car. A separate fixture for each direction is not required; two-stop elevator cars can be served by one fixture that indicates car arrival. All lanterns must be visible from the vicinity of each set of call buttons serving the elevator. Up and down lantern indicators can be placed one above the other or side-by-side. More than one lantern is not required when located inside cars so long as it is visible from the vicinity of the hall call buttons. (Note that in-car lanterns increase door opening time since timing begins after doors open wide enough for the lantern to be visible).

Raised and Braille Characters on Hoistway Entrances [4.10.5]

Raised and Braille floor designations are required on both jambs, with the centerline 60 inches from the finished floor. Raised characters must be 2 inches high. Braille characters are often located below raised characters, although the location is not specified in ADAAG. *Recommendation:* Since Braille characters can be difficult to read if placed too close to raised characters, consider a vertical clearance of at least ⅜ inch. Raised borders can confuse tactile reading of raised characters (and Braille) and should be avoided or spaced away from raised text.

Door Protective and Reopening Device [4.10.6]

Door reopening devices must be able to detect obstructions without contact; otherwise, they can disrupt the balance of people using crutches or canes. They must stop and reopen doors for at least 20 seconds (while obstructed); doors do not have to fully reopen and can close sooner if no longer obstructed. Door safety edges, used alone as the reopening device, are permitted only in alterations where installation of an automatic reopening device is not technically feasible.

Door and Signal Timing for Hall Calls [4.10.7]
Door Delay for Car Calls [4.10.8]

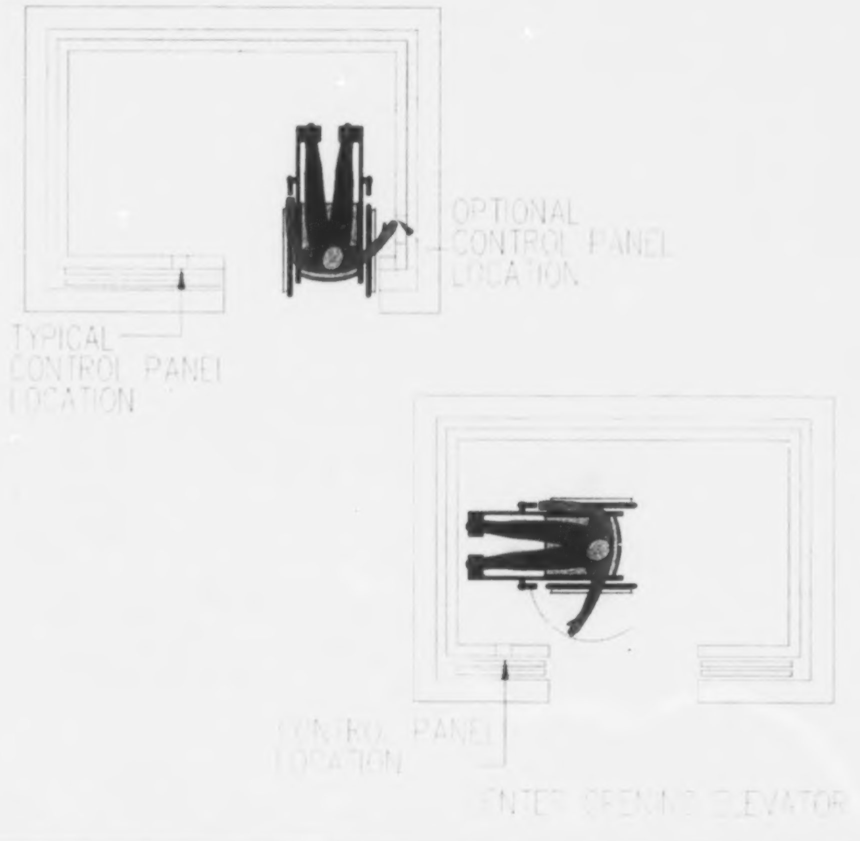
Timing, based on the distance between the farthest call button and the elevator door, begins with visible and audible signaling of car arrival. The minimum time between notification and the start of door closing is 5 seconds. Doors must remain open at least 3 seconds in response to a call.

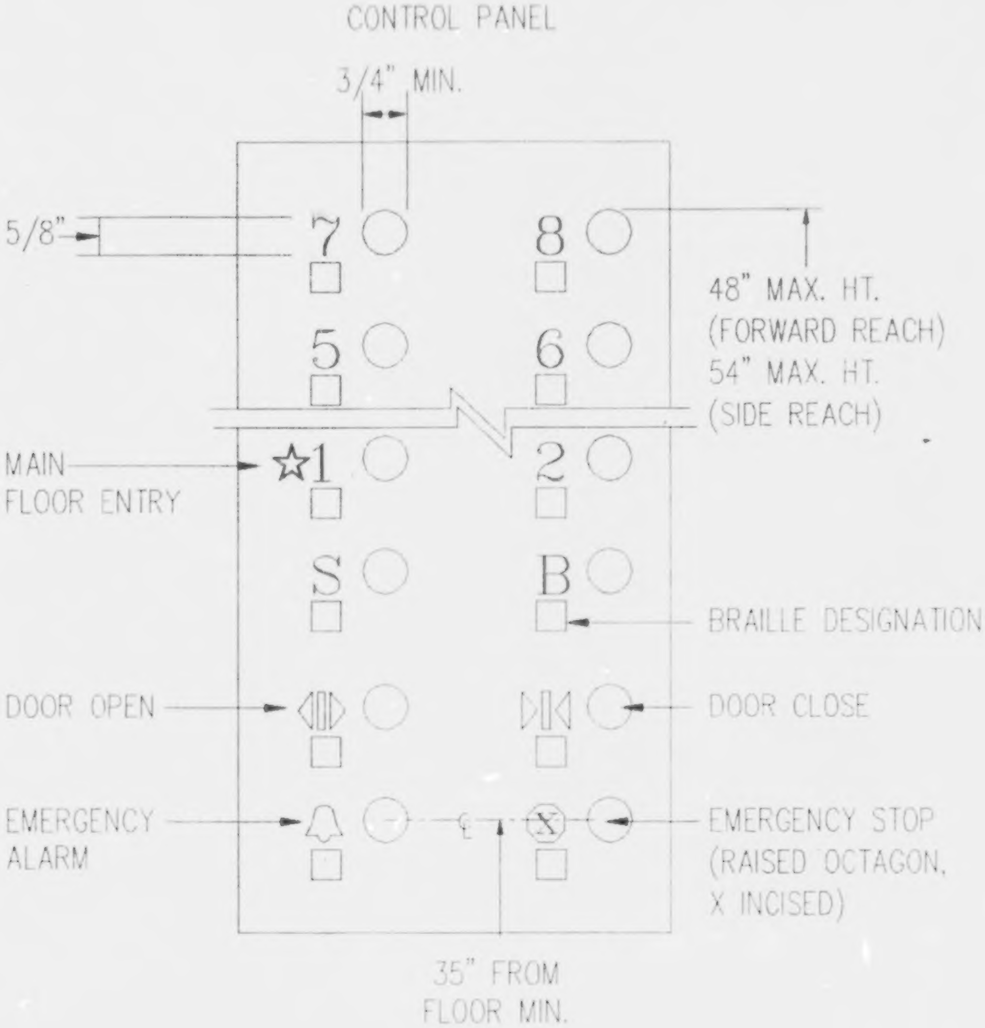
Floor Plan of Elevator Cars [4.10.9]

The car dimensions specified in ADAAG are based on earlier accessibility guidelines developed in accord with industry standards. Alternate dimensions that provide wheelchair turning space (60 inch diameter circle or T-turn) wholly within the car are acceptable. Hospital-type cars sized to accommodate stretchers (usually at least 80 inches long) can have side-opening doors if the car is at least 60 inches wide. The primary test is whether a wheelchair user can enter the car, maneuver within reach of the controls, and exit. In alterations, smaller car sizes (minimum 47 inch width and 69 inch length) are permitted in cases of technical infeasibility, including where limited by existing shaft configurations (minimum car size is 48 by 48 inches). See ADAAG 4.1.6(3)(c).

Car Controls [4.10.12]

Control panels must be located so that no floor button is higher than 54 inches for a side reach and 48 inches for a front approach. *Recommendations:* Buttons on front panels should be located as close to the door as possible, rather than near the corner. Alignment for a side reach is often difficult at panels on the front of cars due to the limited maneuvering space; consider a maximum height of 48 inches for panels on the front of cars. Various control panel designs that accommodate people of short stature, people who use wheelchairs, and all standing passengers are now readily available.


OPTIONAL CONTROL PANEL LOCATION
TYPICAL CONTROL PANEL LOCATION
CONTROL PANEL LOCATION
CENTER OPENING ELEVATOR


CONTROL PANEL
3/4" MIN.
5/8"
7
8
5
6
☆1
2
S
B
48" MAX. HT.
(FORWARD REACH)
54" MAX. HT.
(SIDE REACH)
MAIN
FLOOR ENTRY
BRAILLE DESIGNATION
DOOR OPEN
DOOR CLOSE
EMERGENCY
ALARM
X
EMERGENCY STOP
(RAISED OCTAGON,
X INCISED)
35" FROM
FLOOR MIN.

- buttons must be raised from, or flush with, the faceplate (or trim ring if provided)
- in-car switches not intended for passenger use (in-car stop switches, fireman's operations) do not have to be labeled with raised and Braille characters or symbols
- door closing (if available) and opening buttons are located below the floor buttons
- visible indication does not have to be provided by the button itself (jeweled lights beside buttons are permitted but cannot interfere with the placement of raised and Braille characters)
- emergency controls are not required by ADAAG but are addressed by the elevator code; where they are provided, they must be grouped at the bottom of the panel no lower than 35 inches from the floor
- *Recommendation:* consider a minimum 3/16 inch vertical clearance between Braille and raised characters

Car Position Indicators [4.10.13]
Visual and audible signals that indicate car position are required. Verbal announcements are acceptable and can substitute for chimes or other audible signals. Verbal announcements must announce each floor a car stops at but not each floor passed.

Emergency Communications [4.10.14]
Emergency two-way communication devices, where provided, must meet the ASME A17.1-1990 standard. In order to accommodate people with hearing or speech impairments, ADAAG also specifies that the system not rely solely on voice communication. A voice intercommunication system is not required by ADAAG. An audio system with a visual display can provide information on the status of a rescue. Clearly labeled visual displays can be as simple as lighted jewels that indicate that the call for help has been activated and that this message has been received. Voice intercommunication or other audible systems will provide access for people with vision impairments. The highest operable portion of the communication device must be no higher than 48 inches and no lower than 15 inches. *Recommendation:* Devices that do not require handsets are easier to use by people who have a limited reach. Also, handset compartments with small handles are difficult to open by people who have difficulty grasping.

Emergency communication devices must be identified by a raised symbol with lettering that must be readable (i.e., complies with specifications for character proportion [4.30.2] and height [4.30.3] and contrast [4.30.5]). The specifications for non-raised characters also apply to instructions for the use of the system.

Platform Lifts [4.11]

Scoping [4.1.3(5)]

In new construction, platform lifts can be used instead of ramps or elevators only in providing access to:

- performing areas in assembly occupancies
- wheelchair seating locations in assembly occupancies
- incidental space or rooms not open to the public with a maximum occupancy of five

Platform lifts are also permitted where ramp or elevator access is infeasible due to existing or other constraints.

Performing Areas

Performing areas include spaces typically elevated or depressed and used primarily for purposes of entertainment, including stages, arena floors, and orchestra pits. Lifts can be used to provide access to these areas and, if located on the same level, other areas intended for use by performers but not the public, such as dressing and locker rooms.

Wheelchair Seating Locations

ADAAG requires that lines of sight provided for people using wheelchair locations in assembly areas be comparable to those for the general public. Where the seating capacity exceeds 300, wheelchair locations are required to be dispersed in most cases. Platform lifts can be used to provide access to wheelchair locations in order to meet the line of sight or dispersion requirements of 4.33.3.

Incidental Rooms and Spaces

These can include work areas such as equipment control rooms, projection booths, radio and news booths, press boxes, and other occupiable spaces of incidental use where the maximum occupancy is five and that are not open to the general public.

Site Constraints

Platform lifts are permitted where "existing or other constraints" make ramp or elevator access "infeasible." This is intended to cover altered facilities where limited space or other constraints preclude construction of a complying ramp. An example might include construction of a new infill building with a historic facade which must be maintained (thus predetermining the entry floor level) and where space for a ramp is not available.

Other Requirements [4.11.2]

Platform lifts must comply with all applicable state and local codes and with the ASME A17.1 Safety Code for Elevators and Escalators, Section XX (1990). The ASME code provides specifications for vertical wheelchair lifts and inclined wheelchair lifts. (It also covers inclined stairway chairlifts, but this type of lift, if the chair is fixed in place, does not meet ADAAG requirements for a platform that accommodates wheelchairs). Questions on the ASME standard should be directed to the American Society of Mechanical Engineers at (212) 705-8500.

Vertical Wheelchair Lifts

Vertical lifts are intended for people who use wheelchairs although others may be able to use them under the ASME code if a seat is provided. However, if a fixed seat is provided, the minimum space required for wheelchairs must still be provided. Folding or flip-down seats can be used. The ASME code specifies a maximum travel distance of 12 feet and prohibits penetration of floors.

Inclined Wheelchair Lifts

Inclined wheelchair lifts, which are often installed along stairways, provide a platform accommodating a person using a wheelchair or scooter. Codes generally prohibit inclined lifts from reducing the required width of egress routes. The ASME standard allows inclined lifts with enclosures and those without. Those not enclosed, which are often stowed in a folded position, must be attendant-operated under the ASME standard. ADAAG's requirement for independent operation [4.11.3] prohibits most, if not all, lifts that must be operated by an attendant.

Platform Size and Surface

To be part of an accessible route, lift platforms must provide the amount of clear space required for wheelchairs in ADAAG 4.2.4. The minimum dimensions are based on the approach. Where entry and exit are on the narrow dimension, the space must be at least 36 inches wide and at least 48 inches long. Where entry and exit are at a right angle to each other, the space must be at least 60 inches long so that maneuvering room for the necessary turn is provided. Platform surfaces must be firm, stable, and slip-resistant as required in 4.5. In addition, changes in level between ¼ to ½ inch must be beveled with a slope 1:2 maximum; changes in level more than ½ inch must be treated as a ramp.

Operation

Platform lifts must be independently usable. Lifts that are required to be "attendant-operated" by the ASME code, such as inclined wheelchair lifts that are not enclosed, do not meet this requirement. All lifts addressed by Chapter XX of the ASME code are required to be key operated. Permanently fixed keys can provide the level of "unassisted" use and operation required by ADAAG. (Issuance of keys to specific individuals is acceptable for lifts serving incidental, not public, spaces used by a specific set of users, often employees). Controls must meet requirements in 4.27 for controls and operating mechanisms.

Doors [4.13]

Scoping [4.1.3(7)]

Doors required to be accessible include:

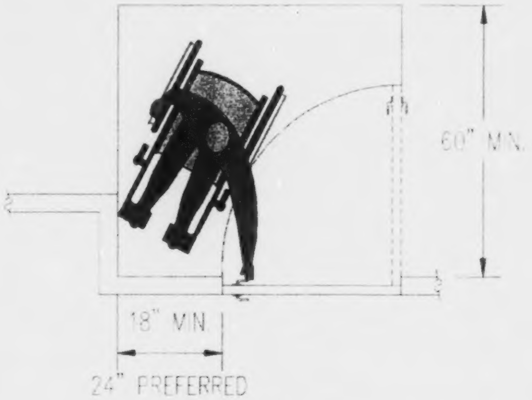
- at least one door at each accessible entrance
- at least one door at each accessible space within a building or facility
- each door that is an element of an accessible route or an accessible means of egress.

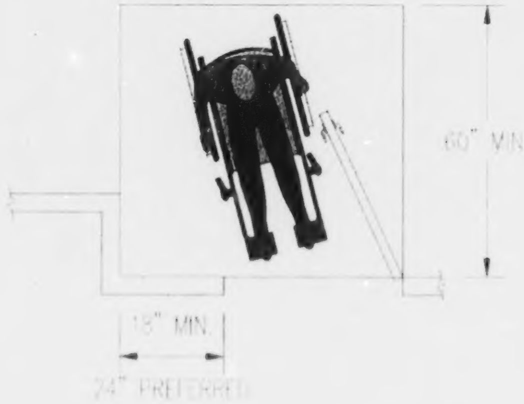
Clear Width [4.13.5] and Vertical Clearance

The clear width of the opening is measured from the face of the door in a 90 degrees open position to the opposite stop. Panic bars and other hardware do not require additional width since they are usually mounted above the widest portion of wheelchairs. In alterations, a projection up to 5/8 inch is permitted for the latch-side stop where it would otherwise be necessary to widen a door. Swing-away or offset hinges can provide additional clearance. Headroom at least 80 inches high is required along all circulation routes, including doorways. Eighty-inch doors, including those equipped with closers, are considered acceptable under this requirement.

Maneuvering Clearances at Doors [4.13.6]

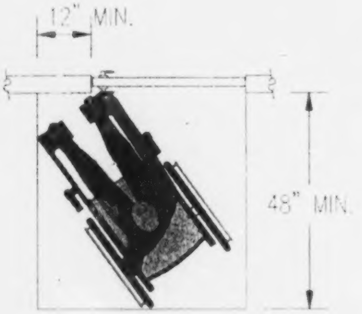
Pull-side clearance beyond the door swing provides space for a forward reach to door hardware. Maneuvering through doors is often done on an angle, particularly at doors with closers, and the minimum space required is also dependent on how the door may be approached.



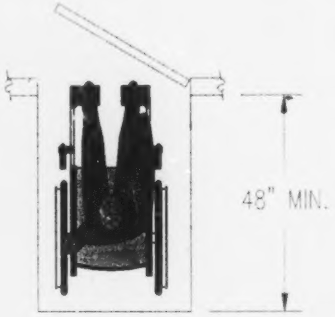


Clearance to the wall plane next to the door (even when the door is in a recess) is essential. This maneuvering space is necessary for anyone using a wheelchair or crutches because the person cannot easily move or step back while opening the door. At what point a recess or the thickness of a wall becomes a problem is not clear. However, the clearance at thick walls must be in the plane of the face of the doorway (unless doors are automated). It is also important that wall-mounted elements, including those with knee and toe space, such as lavatories, not overlap this clearance due to the angled maneuvering necessary. However, limited projections, such as wall-mounted handrails are permitted to overlap clearances.

Latch-side clearance is needed on the push side to be able to operate a latch and maneuver through the door against the force of a closer. The minimum required push-side maneuvering space also is dependent on the approach direction.

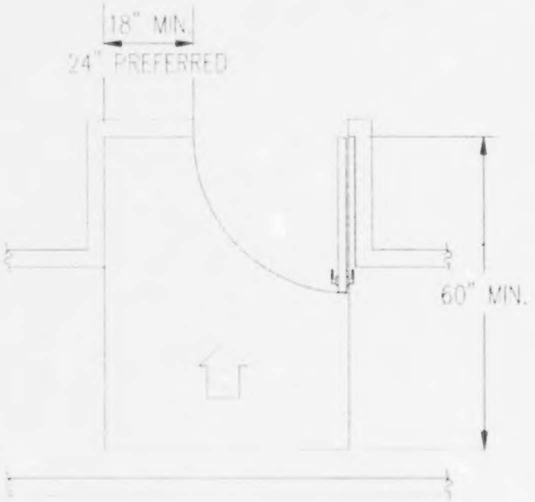


DOOR WITH CLOSER AND LATCH (RECOMMENDED FOR ALL DOORS WITH CLOSERS)



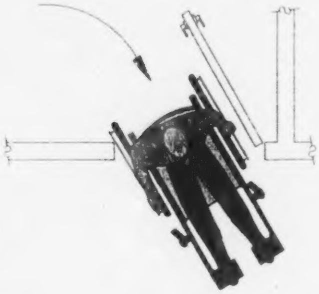
DOOR WITHOUT CLOSER OR LATCH

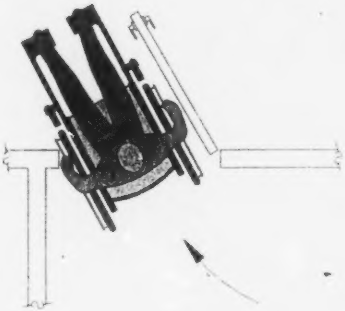
Forward approach clearances are required at doors located in alcoves.



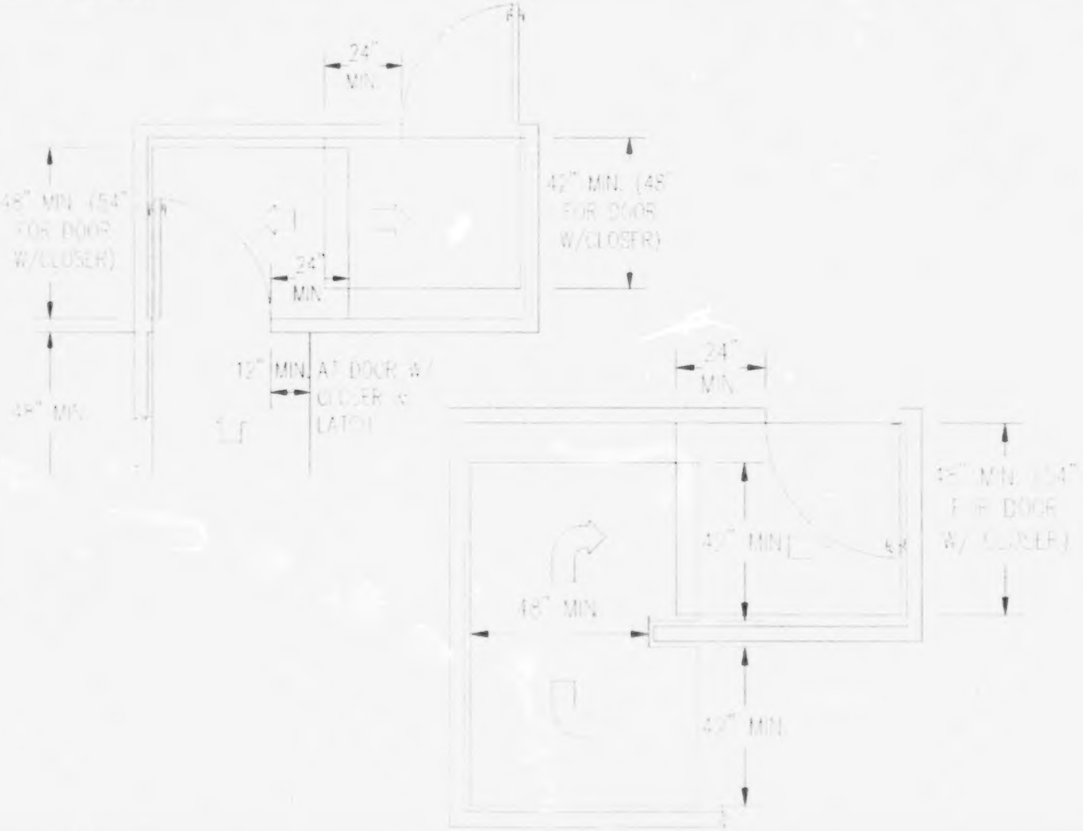
Clearances for Side Approaches

Clearance for side approaches are based on the swing of doors, direction of approach (hinge or latch), and the provision of closers (in some cases latches too). Generally, on the pull side, wheelchair maneuvering is easier from a latch side approach than from a hinge side approach; on the push side, maneuvering is easier from the hinge side than from the latch side.





These clearances, which are permitted to overlap, may determine the width of corridors, including entry alcoves with offset doors. Keep in mind that requirements for accessible routes in 4.3, including those for turns around obstructions, may apply as well.


24" MIN.
48" MIN. (54" FOR DOOR W/CLOSER)
24" MIN.
42" MIN. (48" FOR DOOR W/CLOSER)
12" MIN. AT DOOR W/ CLOSER & LATCH
48" MIN.
24" MIN.
48" MIN. (54" FOR DOOR W/ CLOSER)
42" MIN.
48" MIN.
42" MIN.

Thresholds at Doorways [4.13.8]

Thresholds complicate wheelchair maneuvering through doors, especially at doors equipped with closers. Negotiating level changes while simultaneously resisting the force of closers can be difficult. Also, thresholds can be hard to cross on the diagonal as is often the situation encountered by a person using a wheelchair. ADAAG specifies a maximum threshold height of ½ inch, but allows a height up to ¾ inch at exterior sliding doors where necessary to prevent water damage. Thresholds above ¼ inch must be beveled with a slope no greater than 1:2.

Door Hardware [4.13.9]

Hardware used to operate doors, including handles, pulls, latches and locks, must have a shape that is "easy to grasp with one hand" and does not require tight grasping or pinching, or twisting of the wrist to operate (i.e., no round knobs). Various types of hardware are acceptable although those that can be operated with a closed fist (levers, push bars) or a loose grip (pull handles) accommodate the broadest range of users. Thumb turns, which are operated with simultaneous hand and finger movement, require a high degree of dexterity and coordination and are not recommended. When sliding doors are fully open, the hardware must be exposed and usable from both sides.

Locks and Security Devices

Permanently fixed portions of locks, including key locks, bolts, card readers, and push-button devices with number codes for general use by building occupants must comply with ADAAG specifications. (However, locks at store front gates and other security devices used only by employees in job-related tasks are not required to comply.) Keys, magnetic cards, and other devices not permanently fixed are not technically covered by ADAAG although they may need to be adapted for use by certain individuals as an accommodation. Locks activated by magnetic inserts, card swipes, or push-button pads are easier to use than turn-key locks as they require less grasping or twisting of the wrist to operate.

Kickplates

Recommendation: Some people with disabilities may use walkers or wheelchair footrests to push through doors, particularly those with closers. Applied kickplates can help protect the door surface. If provided, it is recommended that they cover almost the full door width up to a height of 16 inches from the bottom edge.

Door Closers [4.13.10]

Because it may be difficult for a person with a disability to open a door against the resistance offered by a closer, it is important that the closing action be slow enough to allow entry and exit. ADAAG requires that the sweep period of the closer be adjusted so that from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

Door Opening Force [4.13.11]

Measuring Opening Force

The maximum force pertains to the continuous application of force necessary to fully open a door, not the initial force needed to overcome the inertia of the door. It does not apply to the force required to retract bolts or to disengage other devices used to keep the door in a closed position. In measuring with a push-pull scale, force should be applied gradually so that the applied force does not exceed the resistance of the door. While there are instruments specifically designed for this purpose (e.g., tensionometer), a device as simple as a spring-loaded plunger or "fish" scale is effective in measuring the force required to open a door.

Exterior/ Fire Doors

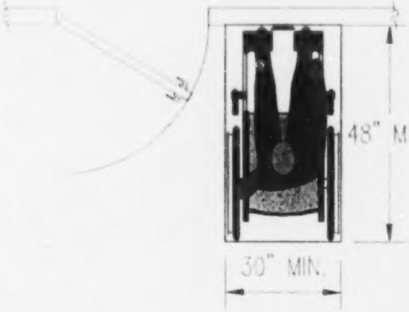
A maximum opening force is not specified for exterior swing doors because the closing force required by building codes usually exceeds an "accessible" resistance. Factors that affect closing force are the weight of the door, wind and other exterior conditions, gasketing, air pressure, HVAC systems, energy conservation, etc. Research sponsored by the Board ("Automated Doors" by Adaptive Environments Laboratory (1993)) indicates that a force of 15 lb is probably the most practicable as a specified maximum. Considering that closing force is 60% efficient, a 15 lb maximum for opening force provides 9 lb for closure and latching, which may be sufficient for most doors. However, a 15 lb opening force greatly exceeds the 5 lb maximum considered suitable for people with disabilities. Providing automatic door openers may be the only practical alternative for ensuring the usability of exterior doors in many cases. Otherwise, the closing force should be set to the lowest level possible. To avoid any conflict with building or life safety codes, ADAAG requires fire doors to have the minimum opening force permitted by the appropriate administrative authority.

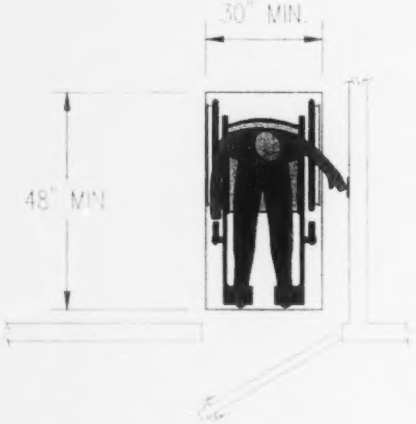
Automatic Doors and Power Assisted Doors [4.13.12]

Automated doors are classified by industry standards according to the level of force produced by the door opening. Fully automatic doors, which produce the most force, are usually activated through control mats or sensory devices and are often used in facilities with heavy traffic such as airport terminals and grocery stores where people may be traveling with luggage or shopping carts. Low-powered doors are typically used at entries with lower levels of traffic to provide an alternative to manual doors, including revolving doors, in the same location. Most operate slowly, allow manual opening, and are often activated by a push button or plate. Devices that can be reactivated before the closing cycle is completed are recommended where traffic may be high. Power-assisted doors facilitate door opening by reducing the resistance force of closers. Some power-assists are activated by opening the door manually (and must meet ADAAG requirements for maneuvering clearance in 4.13.6 and opening force in 4.13.11) while others may be activated by a switch.

Controls

Push buttons or plates and switches are subject to relevant requirements for controls and operating mechanisms, including the maximum 5 lb operating force. *Recommendations:* Buttons and plates should be raised or flush and at least ¾ inch in diameter (as specified for elevator control panels). Consider push plates at least 3 inches in the least dimension since they do not require fine motor coordination or visual acuity to operate. Clear floor space at controls should be located outside the door swing.



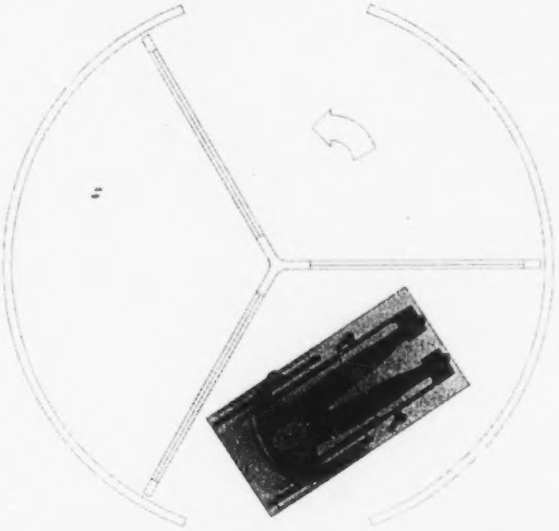


Closers

Automated door closing is addressed by the ANSI/BHMA standards. In addition, ADAAG requires that low-energy doors not open to back check faster than 3 seconds and require no more than 15 lb, which is consistent with ANSI/BHMA A156.19.

Automated Revolving Doors

Automated revolving doors, if large enough, may be usable by many people who use wheelchairs although ADAAG requires that a revolving door not be the only means of passage at an accessible entrance [4.13.2]. An alternate door in full compliance with 4.13 is considered necessary since some people with disabilities may be uncertain of their usability or may not move quickly enough to use them. (Life safety codes also usually require a secondary swing door). While manufacturers have developed safety criteria, the industry safety code for automated doors referenced by ADAAG does not currently address revolving doors, and certain questions remain, such as the appropriate maximum speed.



Research sponsored by the Board ("Automated Doors" by Adaptive Environments Laboratory (1993)) indicates that automated revolving doors, in order to be wheelchair accessible, must have a diameter of at least 10 to 12 feet depending on the number of compartments so that each compartment provides clear floor space at least 30 by 48 inches. Other recommendations from this study include:

- a minimum 32 inch clearance for each leaf when hinged out for emergency use
- safety systems such as motion detectors within compartments and at the door opening that stop door movement without contact
- a slow mode (2 RPM) that can be activated automatically or by user activation (manufacturers have recommended a maximum speed of 4 RPM maximum for general use)
- signage indicating slow down features and other user controls

Entrances [4.14]

ADAAG specifications for the number of public entrances that must be accessible are based on several criteria. Public entrances includes those that serve visitors, employees, or both, and any other entrances except loading and service entrances. Service entrances are required to be accessible where they are the only entrance to a facility.

Scoping [4.1.3(8)]

Public entrances must be accessible according to two sets of criteria that must be met separately:

1. the minimum number of accessible building or facility entrances must equal or exceed the number of required exits or 50% of the number of public entrances (whichever is greater); and
    - at least one entrance to each separate tenancy is accessible
    - at least one accessible entrance serves the ground floor; and
    - main or primary entrances are accessible where feasible

2. in addition, at least one entrance must be accessible to each of the following where provided:
    - enclosed parking garages with direct pedestrian access
    - each pedestrian tunnel
    - each elevated walkway

Exits

Scoping for entrances is based in part on the number of exits required by the applicable building or life safety code. This is required to the extent possible under the intended number of entrances; this provision does not require an increase in the total number of entrances planned for a facility. Sometimes a required exit is designed to be used only as an exit and not as an entrance; in such instances there is no operating hardware on the exterior. ADAAG does not require that this exit also be planned as an entrance.

Separate Tenancies

At least one entrance to each tenancy, such as retail and service establishments of a strip shopping center, must be accessible. This is required even where it would increase the minimum number above the number of required exits or 50% of facility entrances.

Primary Entrances

Those entrances intended to serve a majority of visitors or employees are required to be part of the minimum number made accessible to the extent "feasible." This requirement for accessible primary entrances helps ensure that accessible entrance routes coincide with those intended for the general public.

Direct Connections

At least one entrance that serves enclosed parking garages, pedestrian tunnels, or elevated walkways must be accessible where such connections are provided. This is not intended to increase the number of entrances planned where a building entrance serves more than one of these spaces. Direct connections to transportation facilities are also required to be accessible.

Service Entrances

If service entrances are the only type of entrance provided at a facility, such as a garage or warehouse, then they must be accessible in the amount specified for public entrances. Otherwise, service entrances cannot count toward the number of entrances required to be accessible.

Signage

Where not all public entrances are accessible, accessible entrances must be designated by the access symbol [4.30.7]. This includes entrances made accessible as part of an alteration or addition. Directional signage is required at inaccessible public entrances. Signage should be located to minimize backtracking. (In some cases, this may mean signage at the beginning of a route, not just at the entrance). Directional signage must meet requirements for character proportion [4.30.2] and height [4.30.3], sign finish and contrast [4.30.5] and should include the access symbol [4.30.7].

Drinking Fountains and Water Coolers [4.15]

Drinking fountains and water coolers accessible to people who use wheelchairs may be too low for people with a limited ability to bend or stoop. ADAAG requires access for both user groups. Specifications in 4.15 address wheelchair access. Units that meet conventional industry standards are acceptable for providing access to people who have difficulty bending or stooping.

Plumbed Fixtures

ADAAG covers fixed units where they are provided. Fixed units are not required over units that are not fixed. Where non-fixed units are provided instead, consideration should be given to their usability by people who use wheelchairs and those who may have difficulty bending or stooping. Non-fixed units, such as bottled water coolers, are recognized as an option in providing additional access where only one fixed unit is provided on a floor.

Scoping [4.1.3(10)]

ADAAG does not specify the number of fixtures a building must have. Instead it requires access based on the number provided on each floor so that half (50%) are accessible to people who use wheelchairs. *Recommendation:* Where an odd number of units is provided on a floor, one should round up to the next higher whole number in determining the number that provides wheelchair access.

One Unit Per Floor

Where only one fixed unit is intended on a floor, dual access can be provided by:

- two separate units
- a combination "hi-lo" unit
- a fixed unit that is wheelchair accessible and a non-fixed unit (such as a bottled-water unit)

Recommendation: While other methods may be possible, fixed units are recommended over free-standing units because they require less maintenance and are more reliable from a compliance standpoint. Cup dispensers at fixed units are not recommended but if provided for dual access, the drinking fountain should be wheelchair accessible.

Exterior Sites

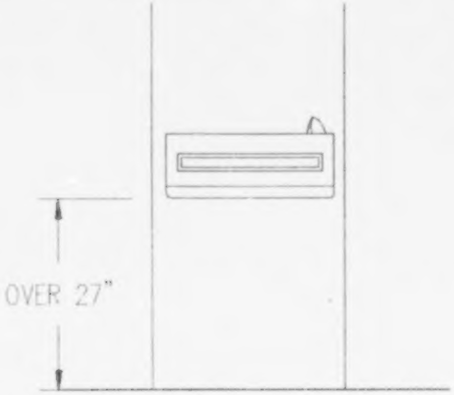
Recommendation: The 50% scoping required for building interiors should be followed for exterior sites. Where only one unit is provided or where they are spaced at considerable distances (such as over 200 feet), consider dual access at each location.

Dispersion

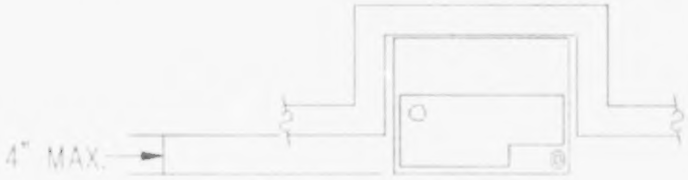
Recommendation: Wheelchair accessible units and standard units should be evenly dispersed to maximize convenient availability. For example, if a floor is occupied by separate tenancies, both types of units should be dispersed to serve occupants of each tenancy. Where only portions of a floor are accessible, such as wheelchair seating in assembly areas, be sure to locate wheelchair accessible units in proximity to, and on an accessible route from, accessible seating.

Standard Units

Units at conventional heights for use by standees are considered accessible to people who may bend or stoop with difficulty. It is important that cantilevered units meet the requirements for protruding objects so they do not pose a hazard to people with vision impairments. Recessing units in alcoves, wing walls, or other means of providing a detectable leading edge at or below 27 inches are acceptable.



ELEVATION



PLAN

Spout Location [4.15.3]

A person using a wheelchair has limited ability to lean over a drinking fountain, especially from a side approach. It is important that the spout be located at the front edge. The trajectory of water flow must be vertically "parallel" or "nearly parallel" to the face of the unit. Since rounded or oval bowls may not have a "front edge," a three inch distance is specified; the entire trajectory does not have to be within this distance.

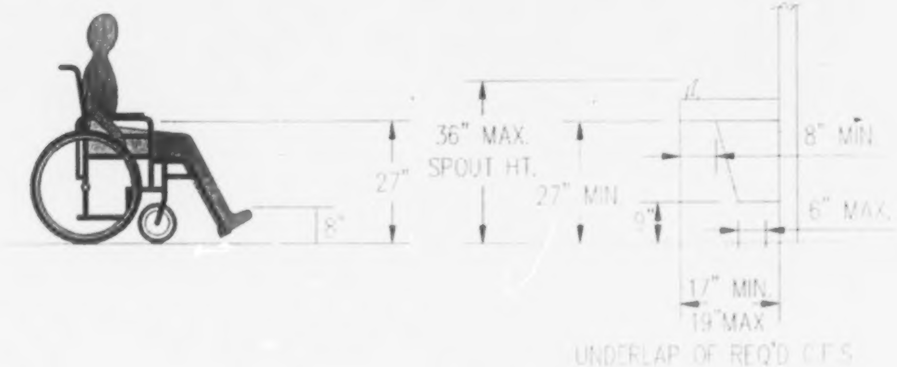
Controls [4.15.4]

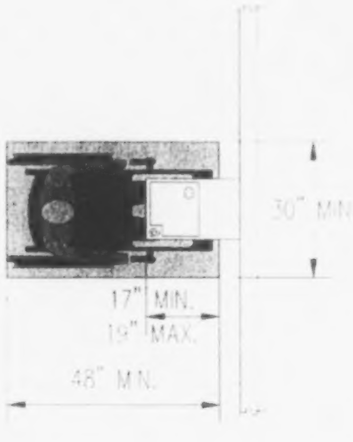
Controls must be operable with one hand and not require tight grasping, pinching, or twisting of the wrist to operate. Push bars are easier to use by a broader range of people because they can be operated with a closed hand, wrist, or forearm.

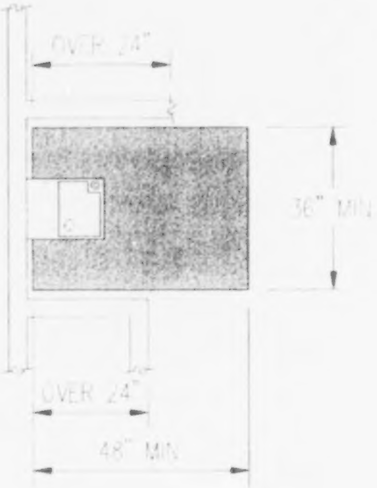
Clearances [4.15.5]

Forward Approach

Drinking fountains are easier to use from a forward approach than from a side approach. Clearances for a forward approach are required at cantilevered units. Knee and toe clearances can be provided at some fountains by locating the cooling mechanism or "chiller" in a wall recess. Clearances below units are specified to provide necessary knee and toe space while allowing room for plumbing. The clearance between knee and toe space is not specified but should be maximized to provide enough room for legs and shins. The 17 to 19 inch clearance depth allows people using wheelchairs to pull up far enough under the unit to reach the spout.


27"
8"
36" MAX.
SPOUT HT.
27" MIN
9"
8" MIN
6" MAX
17" MIN.
19" MAX.
UNDERLAP OF REQ'D C.F.S.

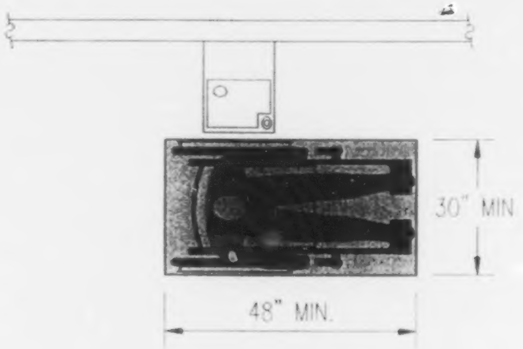

30" MIN
17" MIN.
19" MAX.
48" MIN.

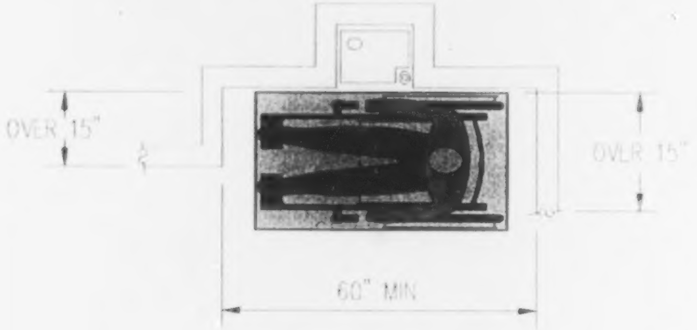

OVER 24"
36" MIN
OVER 24"
48" MIN

Additional maneuvering space is required at units recessed more than 2 feet. *Recommendation:* Consider allowing enough clear space for side approaches as well as for people who use scooters (most models have front tillers that will not clear the fixture for a forward approach).

Side Approach

Clear space for a side approach is specified for units that are free-standing or built-in. Space must be available so that a person using a wheelchair can align properly with the unit. Additional space is required where space is obstructed on both sides, which allows additional maneuvering for turns into the space. *Recommendation:* Since a close approach is often necessary, this space is helpful even at recesses less than 15 inches deep.



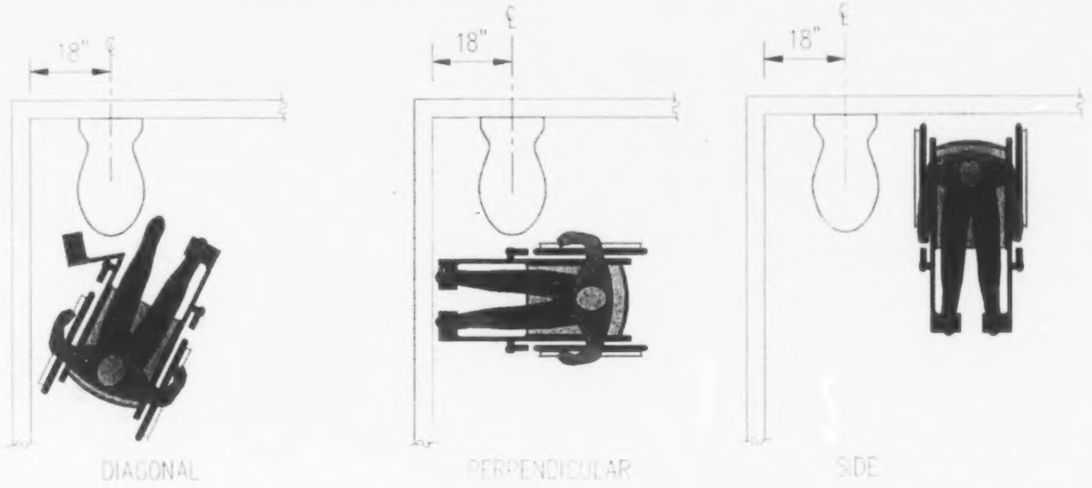


Water Closets [4.16]

Accessible water closets, including those located in stalls, must comply with the requirements in 4.16. Clear floor space requirements at a toilet not located in a stall are different from those for a toilet within a stall.

Wheelchair Transfer

The manner of approach and transfer to water closets varies among people with disabilities. The type and extent of disability, the configuration of fixtures, and the availability of space alongside water closets often determine the technique used. ADAAG specifications are based on three types of transfer: diagonal, perpendicular, and side.



REQUIRED GRAB BARS NOT SHOWN

The clear floor space requirements depend on how a person using a wheelchair can approach the toilet. Unlatching footrests allows a closer approach. The 18 inch centerline placement of water closets keeps the side grab bar within reach. Side transfers are possible where space at least 42 inches from the toilet centerline is available. Armrests are often removed to facilitate transfer.

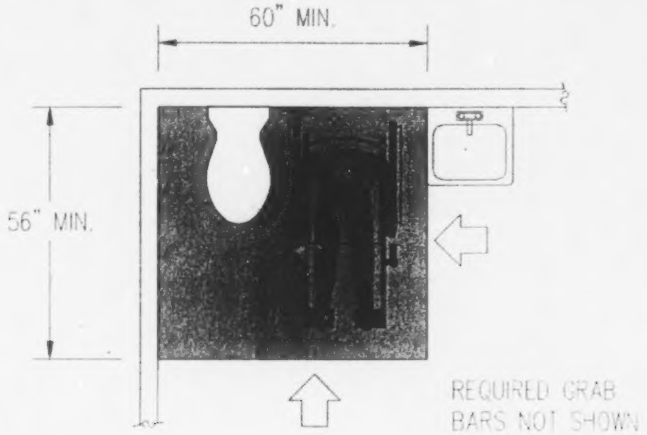
Clear Floor Space [4.16.2]

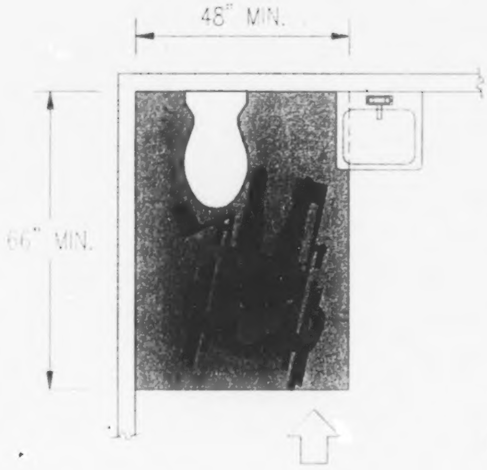
ADAAG (Figure 28) specifies the amount of space required at an accessible toilet, not the minimum room size, which must also include turning space, clear floor space at other provided fixtures, door swing and maneuvering clearance at the door (see pages 83-89). No distinction is made between floor- and wall-mounted water closets as is the case with toilet stalls where space is more confined. Note that:

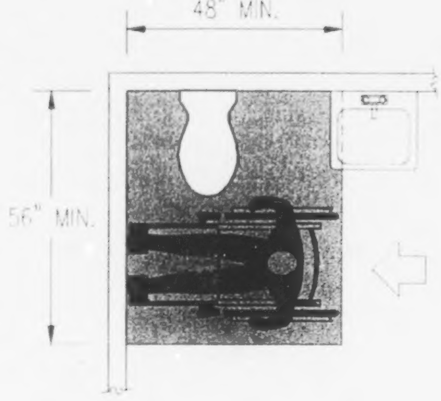
- the toilet may be located to the left or the right of the required clear floor space
- doors cannot swing into the clear floor space required at any fixture
- the 18 inch water closet centerline is absolute

The 18 inch dimension is measured from the finished wall surface; the thickness of the finish must be considered when the plans are dimensioned.

Space at least 60 inches wide is necessary for side transfers and when provided a 56 inch depth is permitted for either a forward or side approach because of the maneuvering space available beside the water closet.







REQUIRED GRAB BARS NOT SHOWN

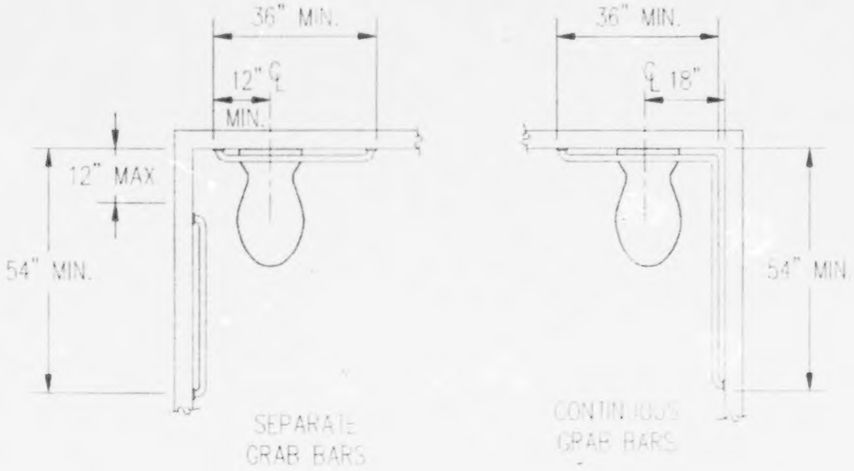
If the lavatory is located less than 42 inches from the toilet centerline, a side transfer is not possible. Clear floor space less than 60 inches wide is dimensioned in length specifically for diagonal or perpendicular transfers based on the approach.

Seat Height [4.16.3]

Height preferences vary among people with disabilities. While higher seats are often preferred by people who are ambulatory, they may be a disadvantage to people who use wheelchairs if higher than the wheelchair seats. The 17 to 19 inch height range matches the typical seat height of most manual wheelchairs.

Grab Bars [4.16.4]

The back grab bar is most usable from the open side. It must be 36 inches long minimum, installed with one end space a maximum of 6 inches from the side wall. In existing facilities where the location of the flush valve conflicts with the grab bar, the bar can be split or shifted to the wide side. Side grab bars, including those that are continuous, must be mounted to extend at least 54 inches from the back wall.



Alternative designs, such as movable grab bars, were considered when ADAAG was developed but information and consensus was lacking on their usefulness and performance. Other designs may be possible under the provision of "equivalent facilitation" in 2.2 although movable or swing-away grab bars on the open side are not allowed as a substitute for the back grab bar.

Flush Controls [4.16.5]

Flush valve controls must be mounted no more than 44 inches above the floor on the wide side of the toilet so that they are within reach from the available clear floor space. This space can be located on either side of the toilet depending on the configuration.

Dispensers [4.16.6]

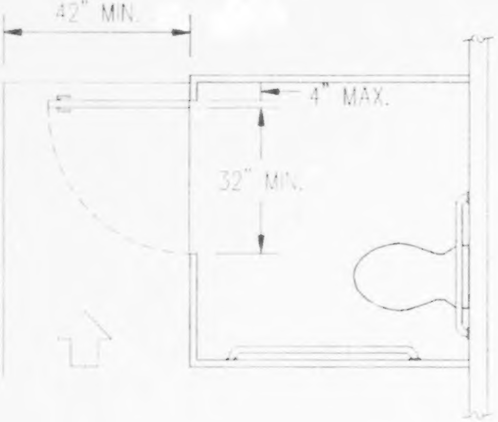
Toilet paper dispensers should be located below the side grab bar so that they do not obstruct use of this bar. For this reason, large dispensers that do not fit below the grab bar should be avoided in accessible toilet rooms or stalls. Dispensers must provide continuous paper flow; those that have separate sheets or that control delivery are prohibited because they require repetitive hand motion and pinching and are not as usable by people with limited use of hands or arms.

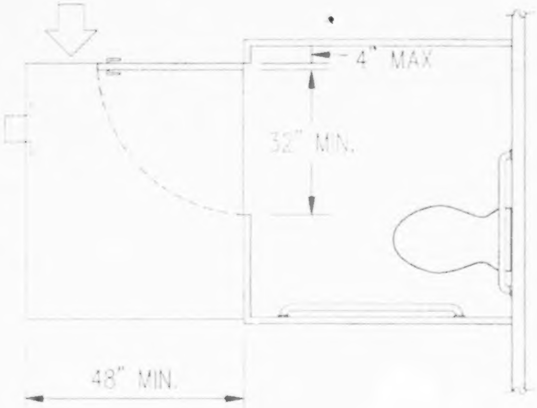
Toilet Stalls [4.17]

The standard stall in section 4.17 is wheelchair accessible. Since wheelchair accessible or "standard" stalls are designed to accommodate the broadest range of users, at least one is required where stalls are provided. The alternate stalls shown in Figure 30(b) can never satisfy new construction accessibility requirements. Only when technical infeasibility can be demonstrated in alterations may an alternate stall substitute for the required standard stall of Figure 30(a).

Size and Arrangement [4.17.3]

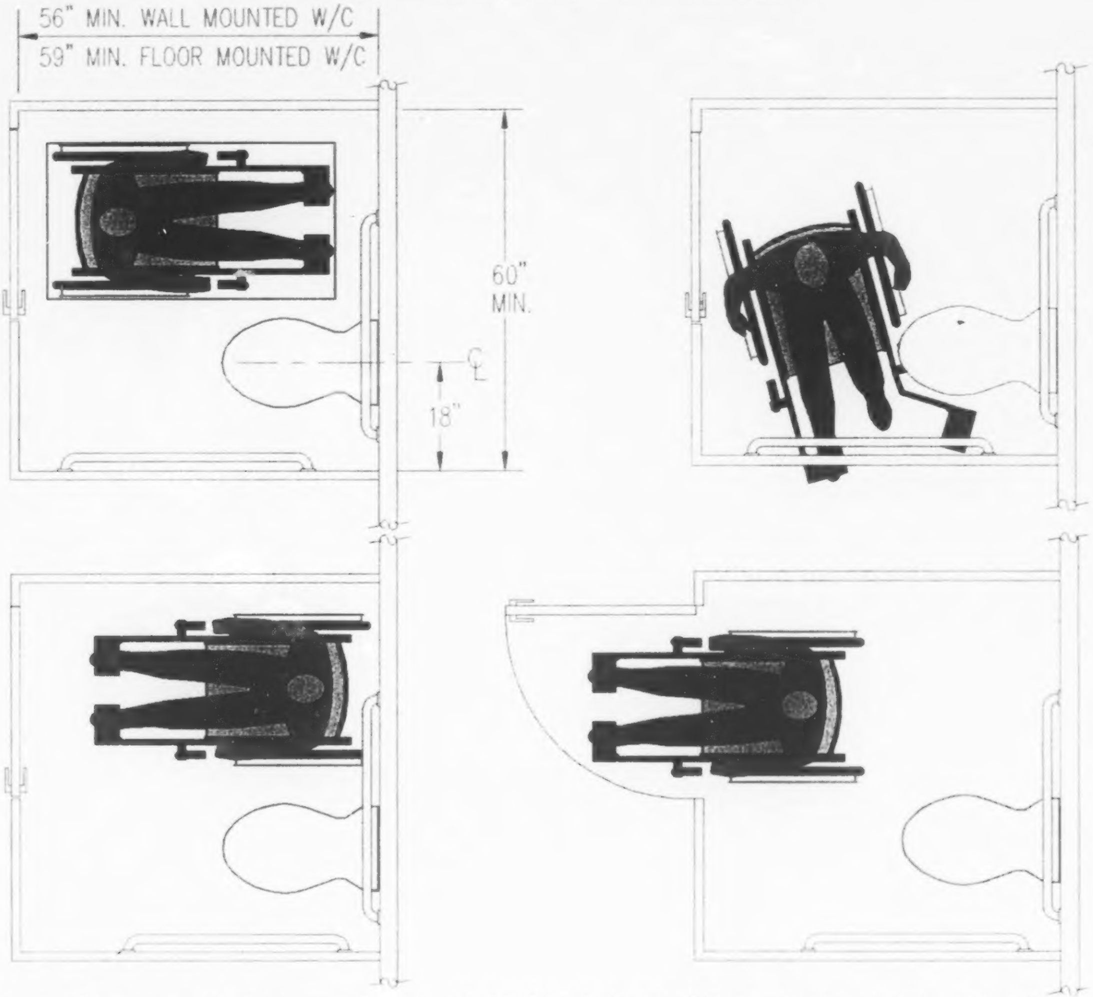
Standard Stall
Stall doors are required to comply with 4.13 although alternate maneuvering dimensions are permitted. The clearances required for stall doors are different than those specified for conventional passage doors and gates in 4.13.6 since partition doors are generally lighter and easier to open. Except for end-of-row stalls, doors must swing out due to the confined space within stalls (less clearance is required on the push side of doors). *Recommendations:* Spring-loaded hinges or secondary door pulls on the hinge side are a good idea in making it easier to close the door. Stalls should be located and configured to allow forward or latch-side approaches which provide easier wheelchair access than hinge-side approaches.





Specifications in 4.13 require that hardware have a shape that is easy to grasp with one hand and that does not require tight grasping or pinching or twisting of the wrist to operate. For latches, consider slide bolts and similar hardware that does not require fine hand or finger movements.

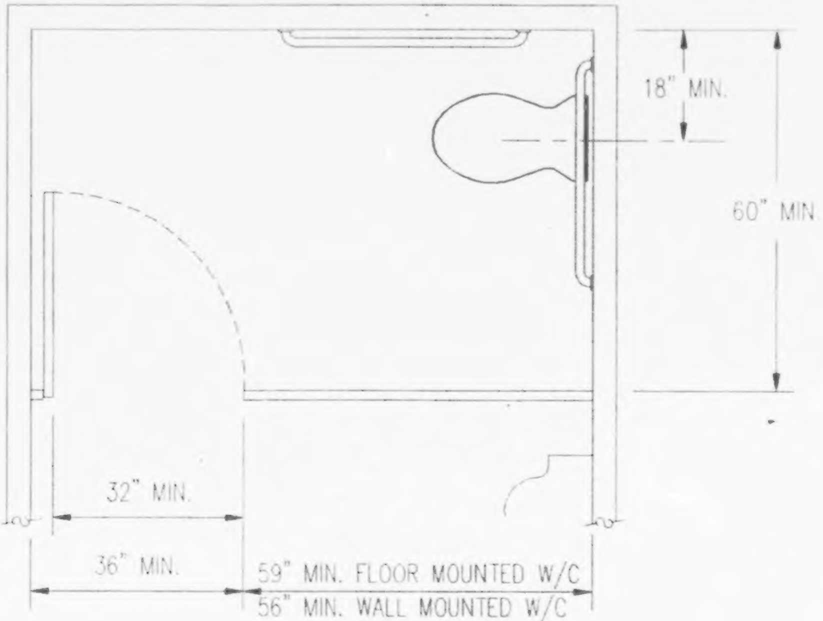
The offset door/water closet configuration (which can be reversed) allows space for entry. Different people use different techniques in transferring from a wheelchair to the toilet seat. Toe clearance below partitions allows additional maneuvering space and permits a closer approach for perpendicular transfers. Toe space at least 9 inches high is required at the front and a side partition in stalls no more than 60 inches deep. *Recommendation:* Ceiling-mounted partitions are a good idea because toe clearance is not interrupted by vertical supports



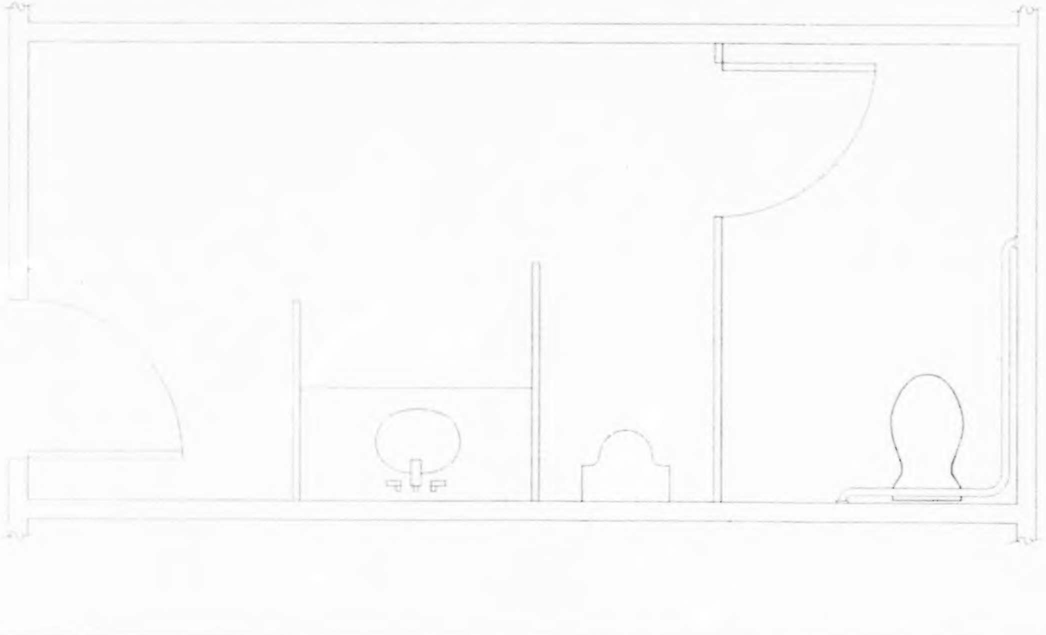
Because floor-mounted toilets commonly project further from the back wall than wall-mounted toilets, the stall depth is increased when a floor-mounted toilet is used. This allows similar maneuvering space.

Clearance alongside a toilet allows space for a side transfer and cannot be obstructed. Note that turning space outside the stall is required in the room whether or not additional maneuvering room is provided in the stall. Out-swinging doors allow adequate clearance (push side) within the confined space of stalls. Keep in mind that ADAAG specifies the minimum requirements. *Recommendations:* Larger stalls, such as those sized to provide turning space wholly within partitions or end-of-row stalls, will provide easier access, particularly for people who use scooters or other motorized devices. Where floor drains are provided, they should be located or otherwise designed (trench drains) so that the floor surface in accessible stalls is level since slopes greater than 2% and drain openings can impede access.

End-of-Row Stalls


18" MIN.
60" MIN.
32" MIN.
36" MIN.
59" MIN. FLOOR MOUNTED W/C
56" MIN. WALL MOUNTED W/C

The design of end-of-row stalls incorporates aisle space into the stall for easier maneuvering; consider this design even where a stall is not located at the end of a row. Toe clearance below partitions is not required but can provide additional maneuvering room. If an out swinging door is provided at an end-of-row stall, maneuvering space of at least 18 inches at the latch side/pull side must be provided.



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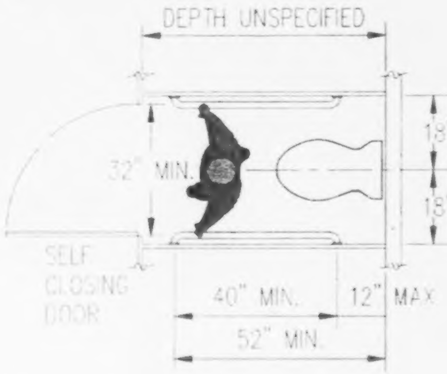
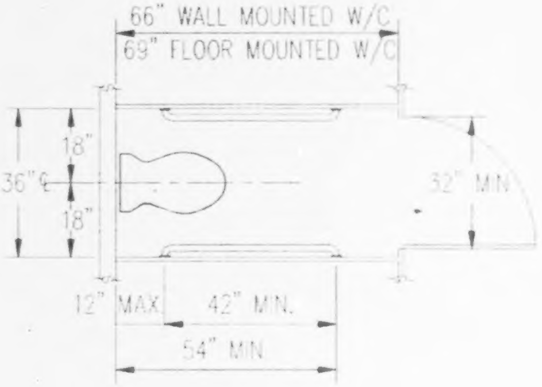
36 Inch Wide Stalls

Where 6 or more stalls are provided (including accessible stalls) in a toilet room or bathroom, at least one must meet requirements for ambulatory access as required by ADAAG 4.22.4 and 4.23.4. This stall is specifically designed for people who have difficulty walking or standing from a seated position. A 36-inch width (absolute) allows the parallel grab bars to be used simultaneously when changing from a standing position to a seated position and vice versa. Out-swinging doors prevent obstruction of grab bars during entry and self-closing hinges keep one from having to reach back to close the door while using grab bars for support. Note that this stall is different from the alternate stall permitted only in alterations (ADAAG Figure 30(b)) and can be as deep as other stalls since it is not intended for wheelchair access.



Ambulatory Access (1 of 6)



Alternate Stall
(Technical Infeasibility)

Alterations: Alternate Stalls

An alternate stall may be substituted for the standard stall only in alterations where full compliance with requirements for a wheelchair accessible stall is not "technically feasible" or where local codes prohibit removal of existing toilet fixtures to make a standard stall. *Recommendation:* Where codes include provisions for waivers, it is recommended that a request for a waiver be made to ensure that the code does, in fact, prohibit the removal of a required fixture.

Alternate designs in ADAAG Figure 30(b) allow narrower stall widths while requiring greater depth. Wheelchair maneuvering and transfer can be very difficult or impossible within these dimensions which is why these designs are permitted only in alterations where "technical infeasibility" can be demonstrated. The 36-inch stall is most suitable for people who are ambulatory (which is why the width is an absolute, not a minimum). While it is also intended to allow some level of wheelchair access as well, it is not usable by most people who use wheelchairs. *Recommendation:* Where possible, a stall at least 48 inches wide should be provided instead where technically feasible.

Urinals [4.18]

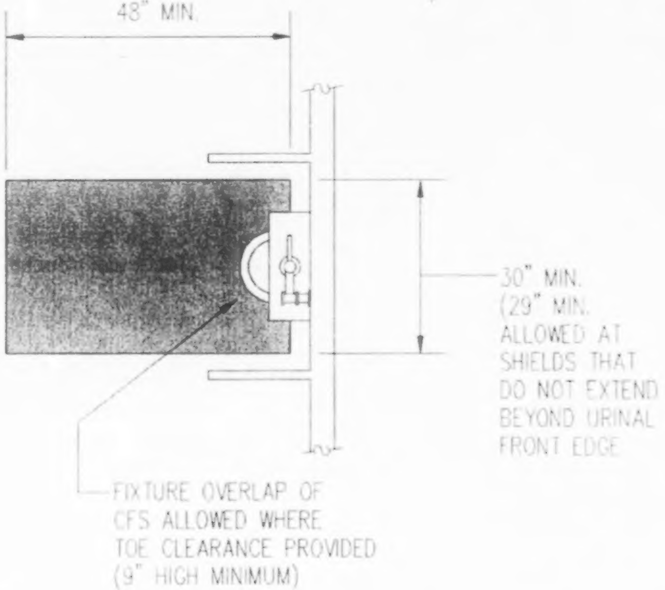
Where urinals are provided, at least one must comply with 4.18.

Height [4.18.2]

The rim of an accessible urinal must be no higher than 17 inches above the finished floor. The rim must be "elongated," but a minimum horizontal projection is not specified. *Recommendation:* Specifying a urinal rim with the maximum projection available is recommended.

Clear Floor Space [4.18.3]

Clear floor space at least 30 inches wide is required, including between partitions where they are provided (when shields do not extend beyond the front of the urinal, a 29 inch clear floor space is permitted).


48" MIN.
30" MIN. (29" MIN. ALLOWED AT SHIELDS THAT DO NOT EXTEND BEYOND URINAL FRONT EDGE
FIXTURE OVERLAP OF CFS ALLOWED WHERE TOE CLEARANCE PROVIDED (9" HIGH MINIMUM)

Flush Controls [4.18.4]

Flush controls must be mounted no more than 44 inches above the finished floor and must:

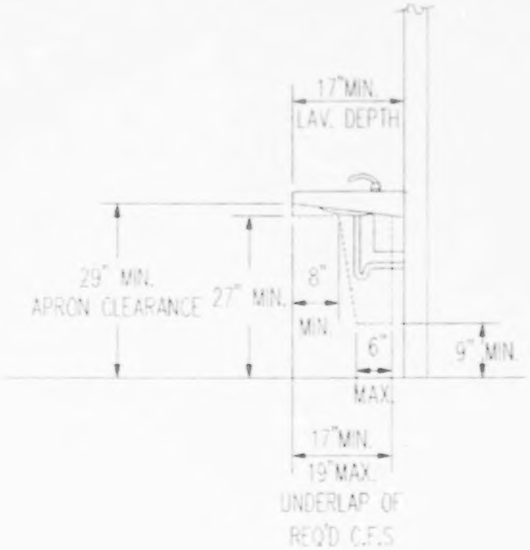
- be automatic or operable by one hand
- operate without tight grasping, pinching, or twisting of the wrist
- require no more than 5 lbf to activate

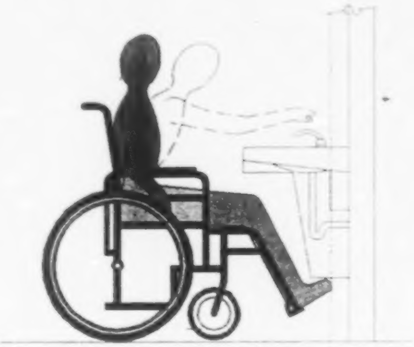
Lavatories and Mirrors [4.19]

If lavatories are provided, at least one lavatory in accessible toilet rooms and bathrooms must be accessible. In those few toilet or bathrooms permitted to be adaptable (see page 83), base cabinetry is allowed as long as required clear floor space and knee and toe clearances are available when the cabinet is removed.

Height and Clearances [4.19.2]

An apron clearance of at least 29 inches (minimum depth not specified) allows a person using a wheelchair to get as close as possible to the front of the lavatory. Knee space at least 27 inches high must be at least 8 inches deep measured from the leading edge. Clearance beyond knee space must provide adequate space for a person's legs and feet.

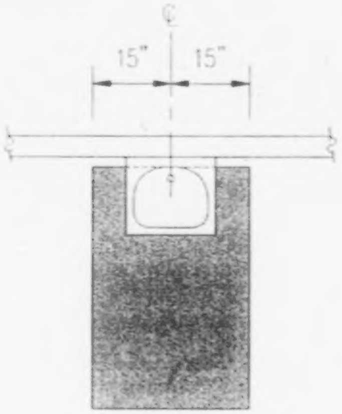


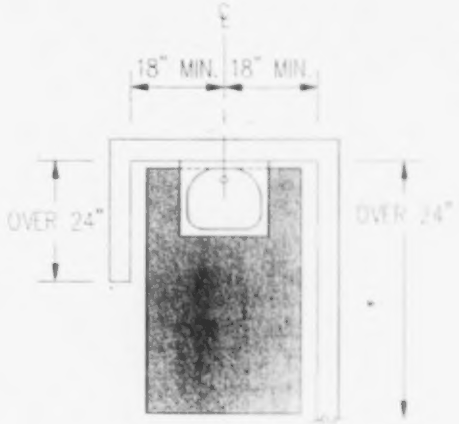


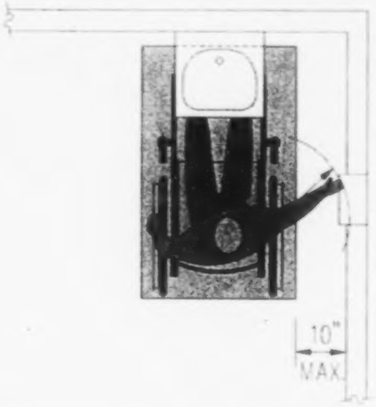
Only a portion of the usable clear floor space can "count" as toe space, which is why a maximum depth and minimum height are specified for the front of the underlap of the required clear floor space. The lavatory or counter may be deeper than 19 inches but the portion of the required 30 by 48 inch clear floor space must underlap the lavatory a minimum of 17 inches and is limited to a maximum of 19 inches. Since plumbing limits how far one can pull up below lavatories, space beyond 19 inches, while permitted, is not considered usable. Deep lavatories or countertops make it difficult to locate soap dispensers, faucet controls, and other elements mounted above lavatories within reach range since a seated reach usually does not extend beyond the toes. Dispensers and controls at accessible lavatories must be within accessible reach ranges.

Clear Floor Space [4.19.3]

Clear floor space should be centered at the fixture (although this is not specifically required by ADAAG). Additional width is required where the clear floor space is obstructed on both sides more than 2 feet (see page 17). *Recommendations:* Consider locating towel dispensers within reach from the lavatory so that people can dry their hands before maneuvering wheelchairs. Consistency in the location of dispensers can make it easier for people who are blind to find them.







Exposed Pipes and Surfaces [4.19.4]

To prevent burns, hot water pipes and drain pipes under lavatories must be insulated or otherwise configured to protect against contact. Exposed sharp or abrasive edges are prohibited. Foam or fiber insulation with protective overwrap on drain, hot water supply, and sharp edges or commercially available rigid pipe covers will satisfy this requirement. The P-trap may also be installed parallel to the wall so that it is located outside the knee/toe space. If an under-lavatory enclosure is used, the specified knee and toe clearances must be maintained.

Faucets [4.19.5]

Faucets must:

- be within reach range
- be automatic or, if hand operated, operable with one hand
- operate without tight grasping, pinching, or twisting of the wrist
- require no more than 5 lbf to activate

Lever-operated, push-type, and automatic controlled mechanisms are acceptable. Self-closing valves, if used, must remain open for at least 10 seconds so that sufficient time is given to people who may have limited arm or hand movement. Faucets that require continuous hand pressure for water flow cannot be used.

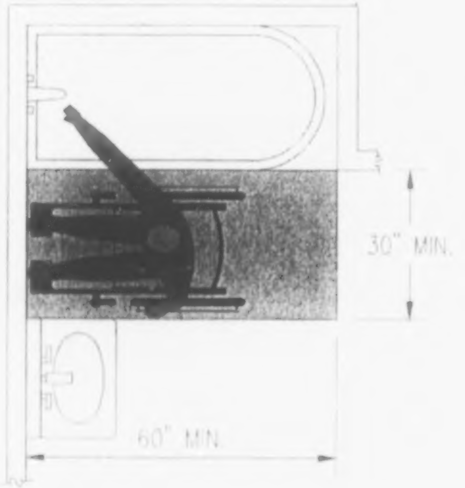
Mirrors [4.19.6]
ADAAG does not require a mirror above the lavatory but requires that if mirrors are provided, at least one must be accessible. The mounting height of the bottom of mirrors at accessible lavatories (40 inches maximum above the floor) is based on the standard eye level range of adults seated in wheelchairs (43 to 51 inches). *Recommendations:* Full-length mirrors that extend up to standard height (74 inches minimum recommended) are a good idea because they serve a broader range of people, including those of short stature and children. Tilted mirrors, though not prohibited, are not recommended because they give a distorted image to a person seated in a wheelchair and cannot be used by a standing person. Clear floor space (30 by 48 inches minimum) for a forward approach located outside the swing of doors should be provided at full-length mirrors.

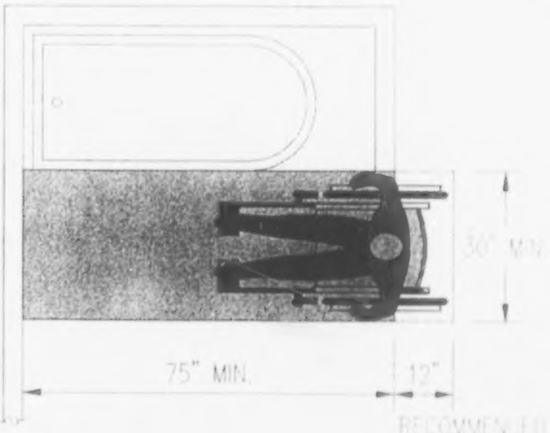
Bathtubs [4.20]

ADAAG allows provision of either tubs or showers in accessible bathing facilities. Where provided in accessible bathing facilities, at least one tub or one shower must be accessible. Note that where tubs are provided, a securely fastened seat (which may be "portable") is required.

Clear Floor Space [4.20.2]

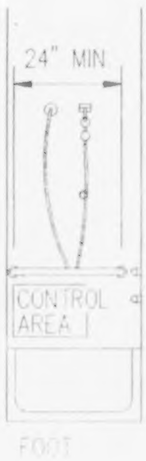
Clear floor space at tubs, which is dimensioned according to the approach, may overlap required turning space within the room. ADAAG allows a lavatory on the same plumbing wall to overlap the clear floor space at the tub because knee and toe clearance is available below an accessible lavatory. If located to overlap this clear floor space at the tub, a lavatory must not project into the tub clear floor space more than 19 inches. *Recommendations:* For easier access to controls, it is better to locate a lavatory beyond this clear floor space. For seats at the head of the tub, consider additional clear floor space to allow positioning for side transfers.

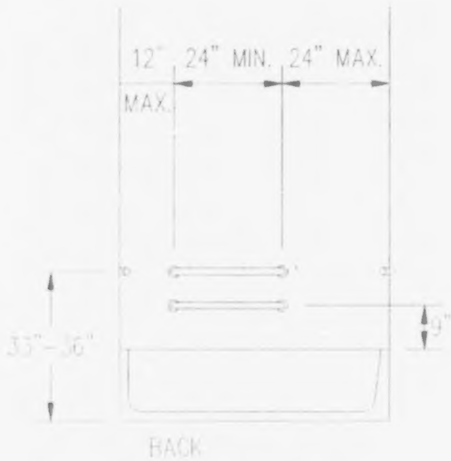




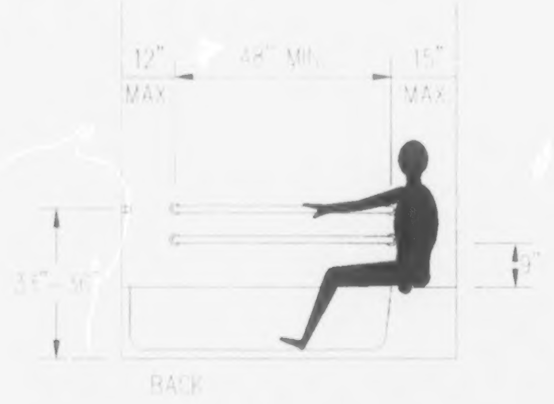
Grab Bars [4.20.4] and Controls [4.20.5]

Controls must be within reach from outside the tub and cannot interfere with the use of the grab bars. Tracks on the tub rim are not allowed as they can interfere with the transfer to tub seats. Dual grab bars on the back wall are needed for transfer to the seat and into the tub.





Seats at the head of the tub are limited to a 15 inch depth so that back support is available from the side wall (which is why grab bars cannot be placed on the seat wall). Dual grab bars on the back wall must extend to the edge of the seat for use in transferring to the seat and for lowering oneself into the tub where one is able to do so. *Recommendation:* A hose for shower spray units longer than the required minimum of 60 inches is recommended for easier use of the shower spray unit from the seat.



Shower Stalls [4.21]

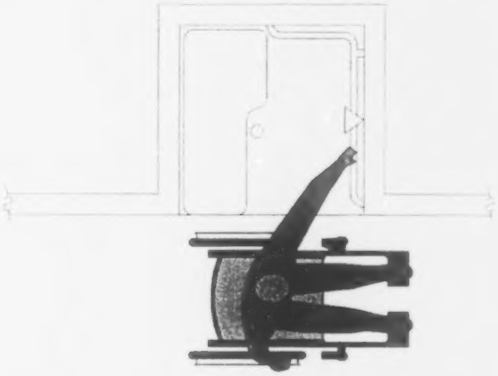
In accessible bathing facilities, at least one tub or one shower must be accessible. ADAAG provides specifications for several types of shower stall designs: roll-in, transfer, and, in hotels (section 9), a combination of the two. Often a shower chair, a mobility aid more suitable for bathing than a typical wheelchair, is used with roll-in showers. Roll-in showers are most practical where shower chairs can be made readily available (e.g., dwelling units, dormitories, rehabilitation facilities). A folding seat in a roll-in shower offers greater flexibility by allowing transfer as well. Combination roll-in/transfer stalls are required in a portion of hotel guest rooms for this reason. ADAAG does not specifically address accessibility in gang showers; a roll-in shower can be incorporated into the design by providing grab bars in a complying configuration.

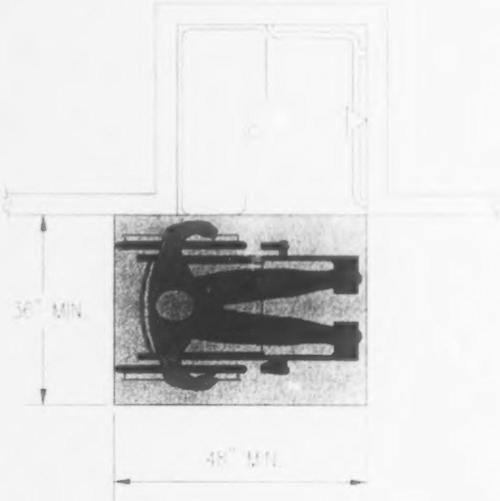
TRANSFER STALLS

Size and Clearances [4.21.2]

Clear floor space is specified for side transfers. Where a forward approach is provided, space at least 60 inches wide provides room for turning. *Recommendations:* Consider additional clear floor space beyond the control wall to facilitate the reach to controls. (Where a row of stalls is provided, avoid locating accessible stalls in corners).

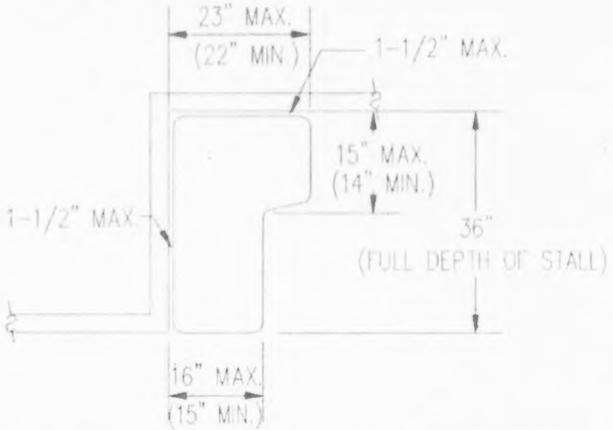
The 36 by 36 inch dimension, measured to the interior finish, keeps front and side grab bars within reach from the seat. Grab bars are configured so they do not interfere with use of the seat.





Seat [4.21.3]

ADAAG specifies maximum seat dimensions. Minimum dimensions contained in the CABO-ANSI A117.1-1992 standard are acceptable. The seat must extend the full depth of the transfer stall to help minimize the gap between the seat and a wheelchair. Folding seats can be used.



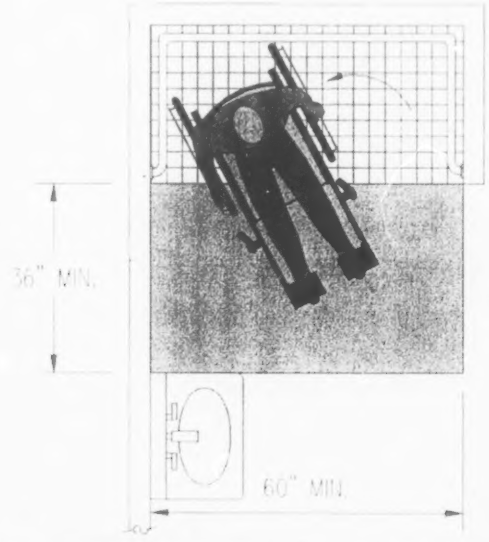
Curbs [4.21.7]

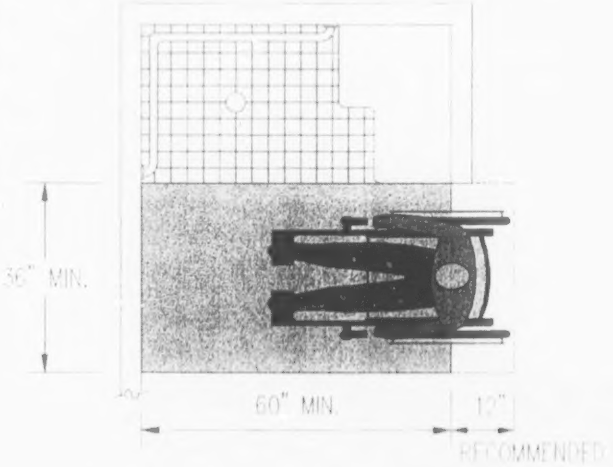
Curbs are limited to ½ inch (measured from the room floor and the shower floor) so as not to interfere with entry to the shower. This height limit also allows wheelchair footrests to clear the curb so that a person using a wheelchair can partially pull into the stall for transfer to the seat.

ROLL-IN SHOWER STALLS

Size and Clearances [4.21.2]

Lavatories can be located within the clear floor space (as shown in ADAAG Figure 35). *Recommendation:* Placing them beyond this space however can provide easier maneuvering to and from the shower. When a seat is provided in a roll-in shower, it must be a folding seat. *Recommendation:* Twelve inches of additional clear floor space at the seat will facilitate side transfers.





Controls [4.21.5]

Controls and shower units can be located on any wall but where a folding seat is provided they must be located to be within reach of a person on the seat. Grab bars are configured differently in showers with seats so that a person can lean back against the wall for support. The dimensions for seats in 36 inch stalls are appropriate for seats in roll-in showers as well.

Curbs [4.21.7]

Curbs are not permitted at roll-in showers. A slope up to 2 % is allowed for drainage.

Toilet Rooms and Bathrooms [4.22 & 4.23]

Scoping [4.1.2(6), 4.1.3(11)]

Building codes, plumbing codes, or health regulations in force locally define the number and type of toilet/bathing facilities (and fixtures) required in a building or facility. ADAAG requires access to toilet/bathing facilities (and fixtures) where they are provided. (In multi-story buildings exempt from the elevator requirement, toilet/ bathing facilities are required on the accessible ground floor if provided on other floors.) Access is required to all toilet rooms and bathrooms provided for public or common use. "Common use" includes those serving a defined or restricted group of occupants (e.g., employees, students). Where toilet or bathrooms individually serve multiple public or common use spaces of the same type required to be accessible (e.g., patient exam rooms), then access is required to each toilet or bathroom.

Portable Units [4.1.2(6)]

Where portable single-user toilet or bathing units are provided at exterior sites, at least 5%, but no less than one, must be accessible at each location. (This does not apply to units used only by construction personnel at construction sites). Portable units are subject to the same technical criteria applicable to permanent facilities. Where ramps are provided, it is important that required door clearances are available at the required level landing.

Adaptability

Toilet rooms designed for use by a single occupant of a specific space, can be designed to be "adaptable" so that accessible elements can be installed when needed after construction. ("Adaptability" is defined in ADAAG 3.5). This allows structural reinforcement or blocking for later installation of grab bars and removable base cabinetry below lavatories. It is not intended to include moving walls, relocating plumbing, replacing fixtures, widening door frames, or other work more appropriately addressed in design and construction. Rooms need to be designed to provide required clear floor space at fixtures, turning space, and door clearance.

Unisex Restrooms

Single-user toilet rooms offer benefits to people who use attendants and are a good consideration in occupancies with high traffic, such as shopping centers and airport terminals. In certain occupancies, model codes actually require unisex toilet rooms. Accessible unisex restrooms cannot be used as a substitute for accessible multi-user restrooms (except in alterations where making existing restrooms fully accessible is not technically feasible).

Alterations [4.1.6(1), (2)]

In alterations, access is required where toilet or bathing facilities are altered. Compliance is governed by the scope of work and can be followed on an element-by-element basis unless the work, when taken together, amounts to a full alteration of the space. For example, if the work is limited to specific elements, such as replacement of a lavatory and floor coverings, then at a minimum each altered element must comply with ADAAG. Work broader in scope that may include such things as reconfiguration of walls and plumbed fixtures, generally requires full room access. Restroom accessibility is also required as part of a "path of travel" to altered primary function areas to the extent it is not disproportionate to the overall cost.

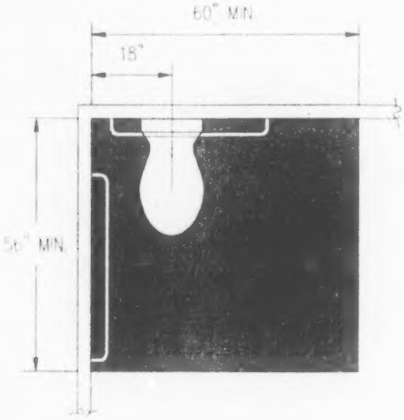
Room Dimensions

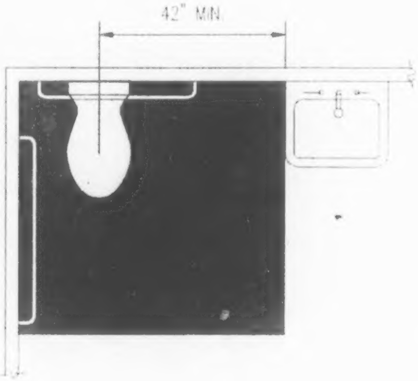
ADAAG does not specify room dimensions; these vary according to the number and configuration of fixtures, room layout, and the way various spatial requirements are met. For single-user toilet rooms, key considerations include the configuration of water closets and lavatories, clear floor spaces required at fixtures, turning space, the location and swing of doors, and maneuvering space at doors. An important consideration is whether or not space for side transfers is provided.

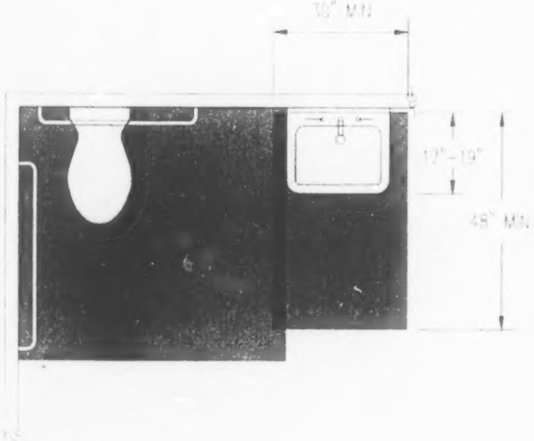
The following illustrations provide several examples of complying accessible single-user toilet rooms. Note, however, that ADAAG requirements apply to multi-user toilet rooms and bathing facilities as well.

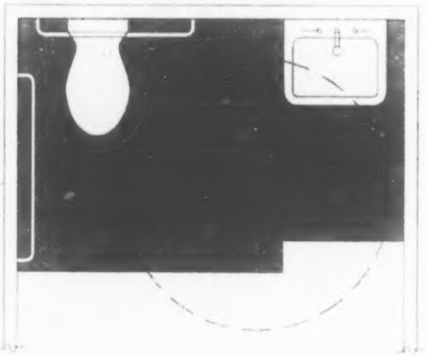
Single-User Toilet Rooms: Side Transfer Space

These drawings illustrate the space requirements for a single-user toilet room with a single plumbing wall. Clear floor space at water closets at least 60 inches wide allows room for side transfers. Lavatories can abut this space (or overlap it as shown on page 89).



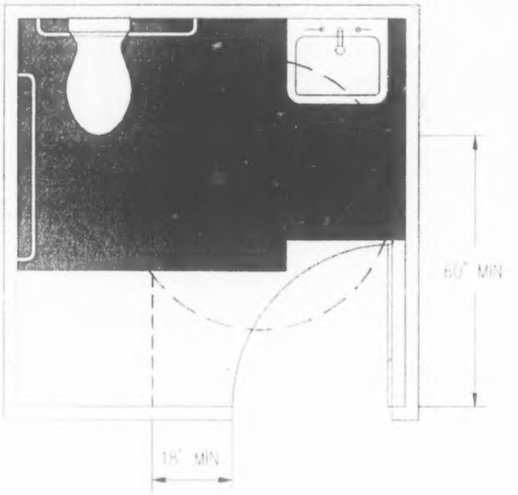


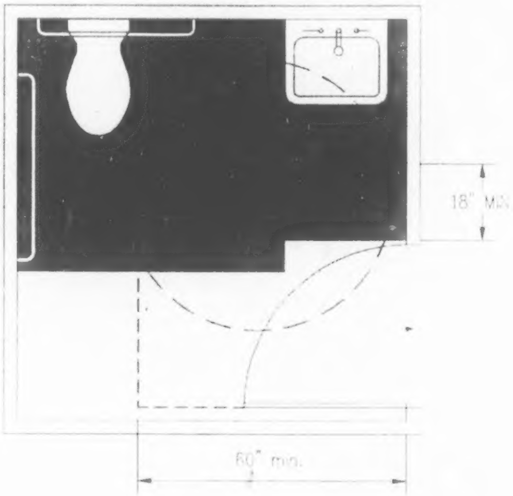


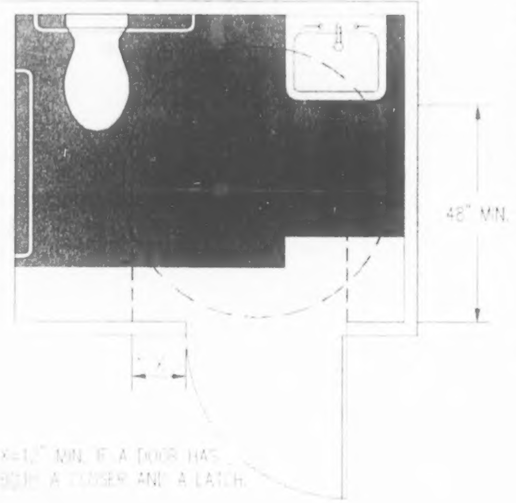


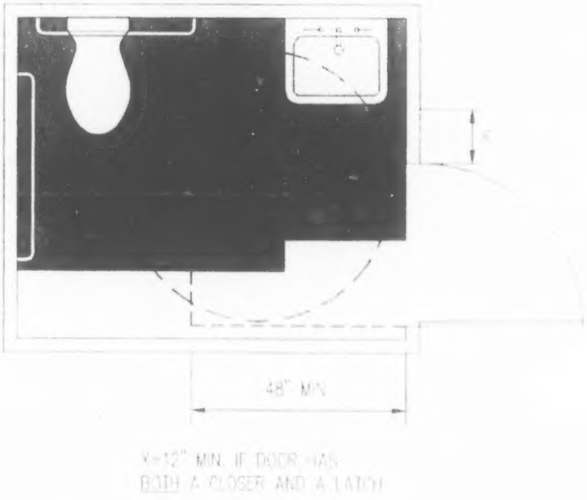
Clear floor space should be centered at lavatories. This clear floor space, which can overlap space required at water closets, must extend 17 to 19 inches below the lavatory. Where provided, towel dispensers within reach from the lavatory will allow people to dry their hands before maneuvering from the fixture (see page 76). Knee and toe clearances below fixtures can overlap turning space, although this should be limited where the space is confined to the minimum (see page 15). Turning space can be provided in the form of a 60 inch diameter circle (as shown) or T-shaped space.

Doors must comply with 4.13, which specifies maneuvering clearances. The location of doors is based on their size and sweep. Doors can swing into the turning space but not the clear floor space required at fixtures. In-swinging doors clearing fixture clearances usually determine the minimum room depth.


60" MIN
18" MIN


18" MIN
60" min.

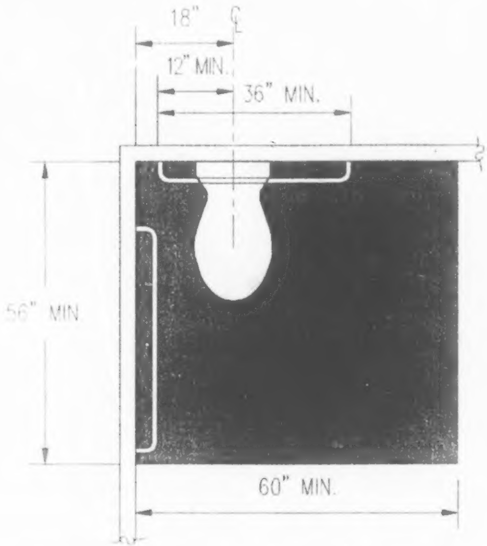

48" MIN.
X
X=12" MIN. IF A DOOR HAS BOTH A CLOSER AND A LATCH.

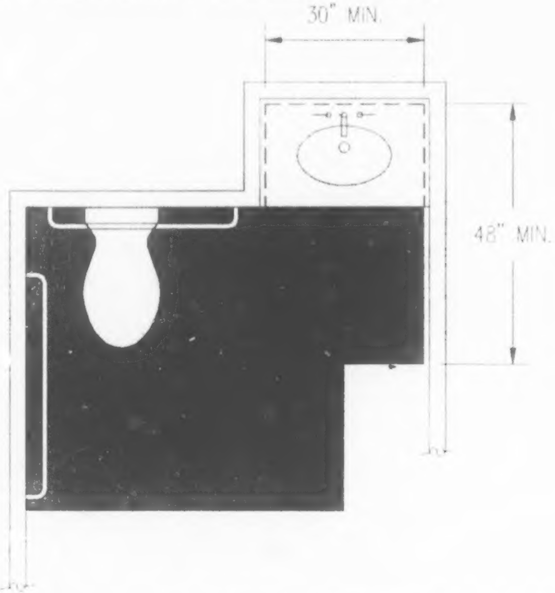

X
48" MIN
X=12" MIN. IF DOOR HAS BOTH A CLOSER AND A LATCH

Where doors can swing out, the minimum room depth is typically determined by the lavatory depth and door clearances for forward approaches; (turning space is usually available within these dimensions). For side approaches, it is often determined by the turning space and the degree of fixture overlap. Latch-side clearance 12 inches minimum is required on the push-side of doors equipped with both a closer and latch; otherwise, clearance beyond the stop is not required.

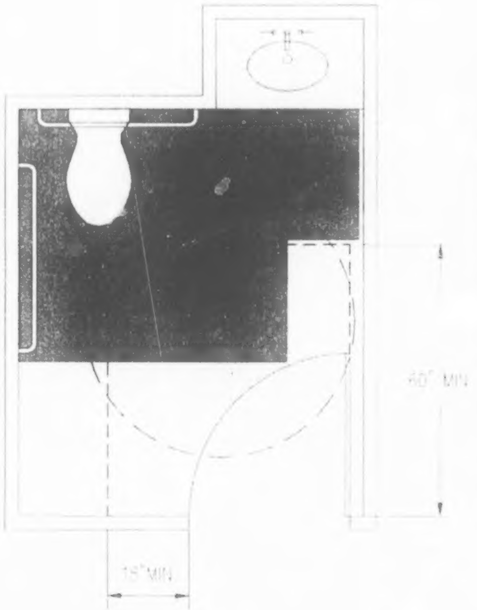
Recessed Lavatories

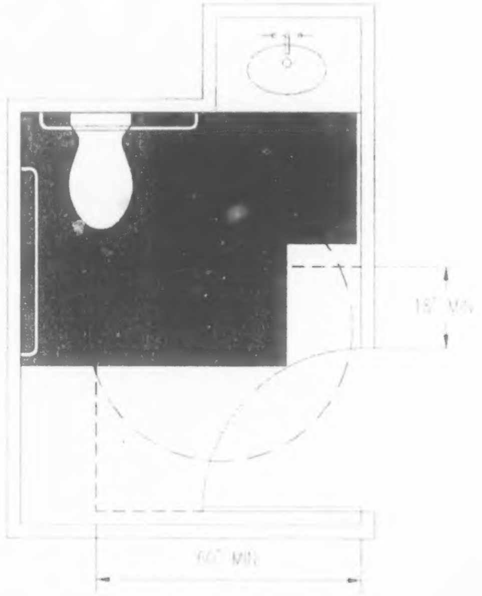
Recessing lavatories can provide space for side transfers while allowing a narrower room width. The rear grab bar determines the minimum distance of the lavatory from the water closet. (If the clear floor space at the lavatory is obstructed on both sides more than 2 feet then it must be at least 36 inches wide instead of 30 inches.)


18"
℄
12" MIN.
36" MIN.
56" MIN
60" MIN.

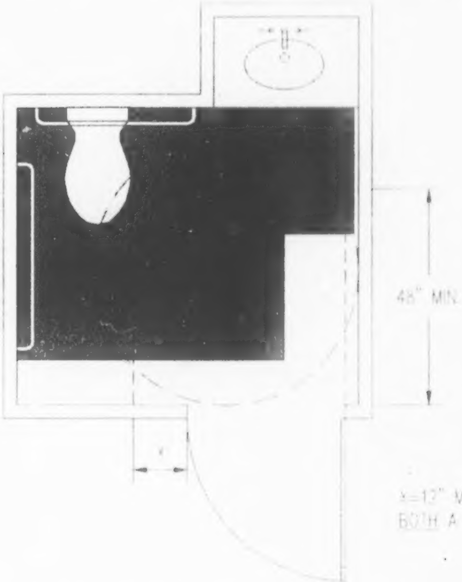

30" MIN.
48" MIN.

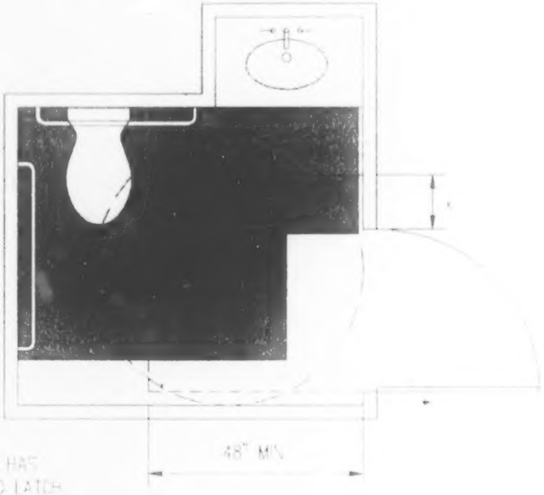
In-swinging doors must clear fixture clearances and door clearances must clear the water closet fixture (verify toilet length).


60" MIN
18" MIN

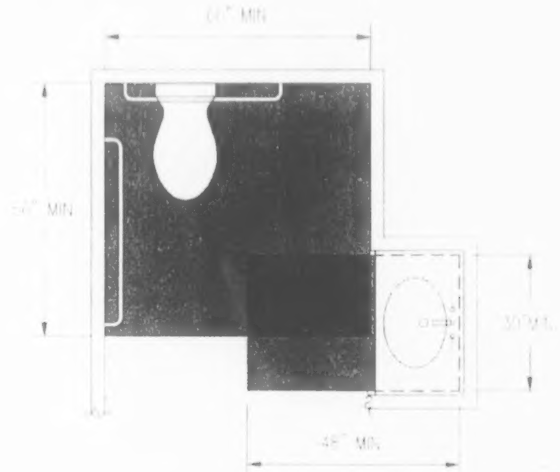

18" MIN
60" MIN

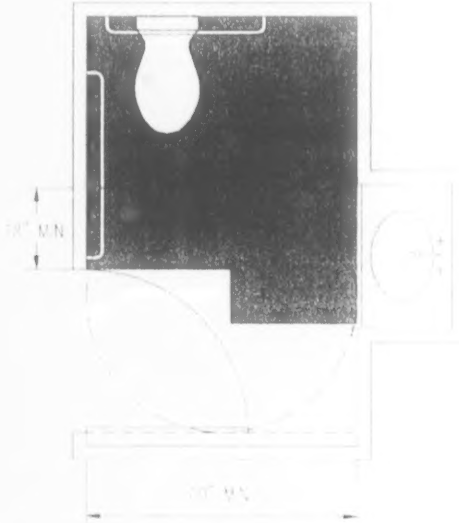
Where doors swing out, the turning space typically determines the minimum room depth.


48" MIN
X
X=12" MIN. IF DOOR HAS
BOTH A CLOSER AND LATCH



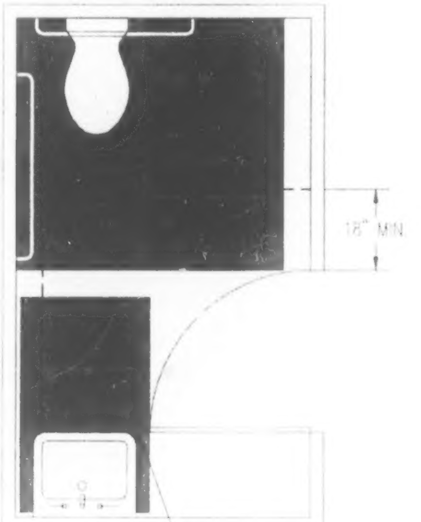
Lavatories can also be recessed on a side wall. Where plumbing is split, clear floor space at the water closet must allow side transfer (i.e., be at least 60 inches wide). As with the previous layouts, in-swinging doors clearing fixture clearances usually determine the minimum room depth. (Doors can also be located on the wall opposite the water closet). Door clearances and turning space usually determine the minimum room depth where doors swing out (not shown).

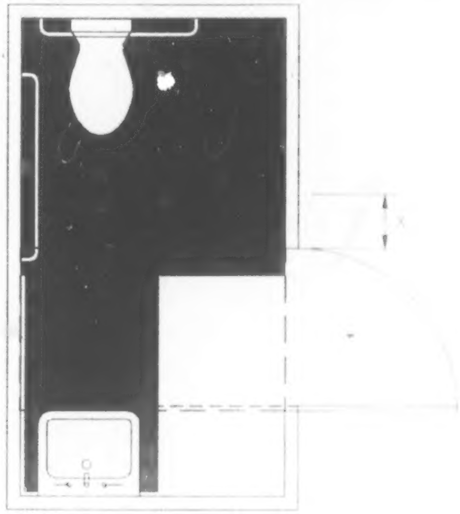

60" MIN
56" MIN
30" MIN
48" MIN

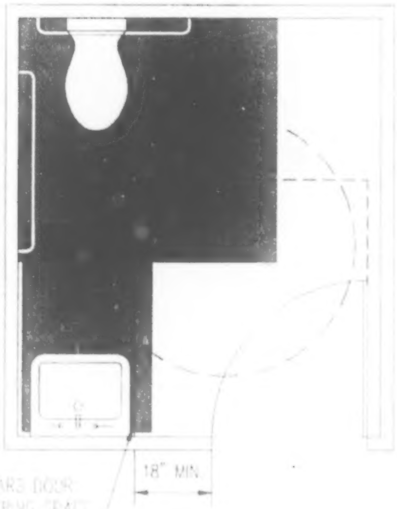

18" MIN
60" MIN

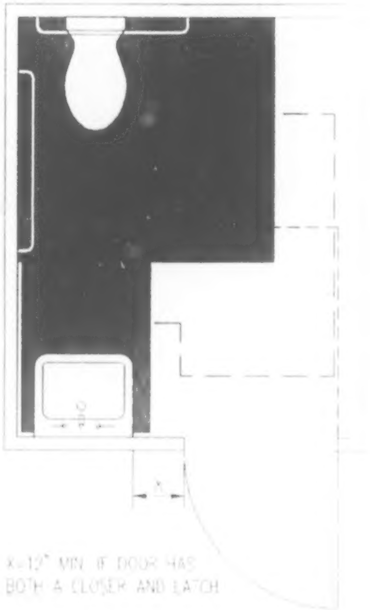
Single-User Toilet Rooms: Split Plumbing

Water closets and lavatories can be located on opposing walls. Note that lavatories (and other fixtures) cannot overlap door maneuvering clearances, including latch-side clearances. While the knee and toe clearance required at lavatories may allow a forward approach to door hardware, if placed in the maneuvering space, lavatories interfere with wheelchair maneuvering through doors.


18" MIN
LAV CLEARS DOOR
MANEUVERING SPACE
AND DOOR DOES NOT
SWING INTO C.F.S. AT LAV



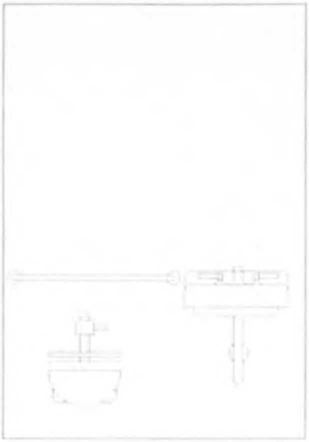

18" MIN
LAV CLEARS DOOR
MANEUVERING SPACE

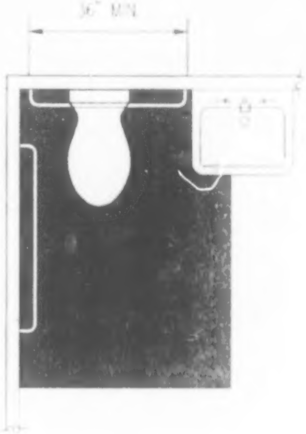

X
X=12" MIN. IF DOOR HAS
BOTH A CLOSER AND LATCH

If T-shaped turning space is provided, it should be located to provide an easy approach (i.e., one of the segments aligned with the route into the room). Fixtures with knee or toe clearance can overlap turning space, but fixture overlap should be limited to one segment of the T (see page 15).

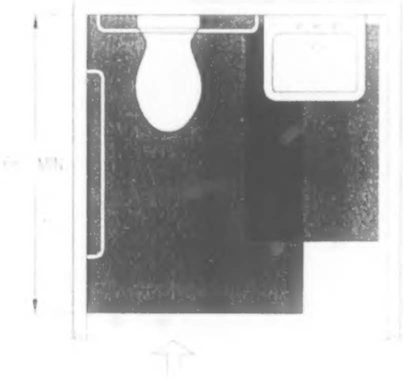
Single-User Toilet Rooms: No Side Transfer Space

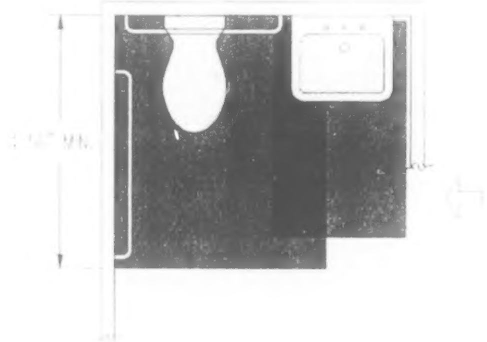
On single plumbing walls, lavatories can overlap water closet clear floor space although this precludes side transfers. Lavatory placement is limited by the rear grab bar, which should not overlap counter surfaces.





Where side transfer space is not provided, clear floor space for water closets is dimensioned for diagonal or perpendicular transfers based on the approach. Door clearances and turning space, as shown in the preceding examples, further determine minimum room dimensions.





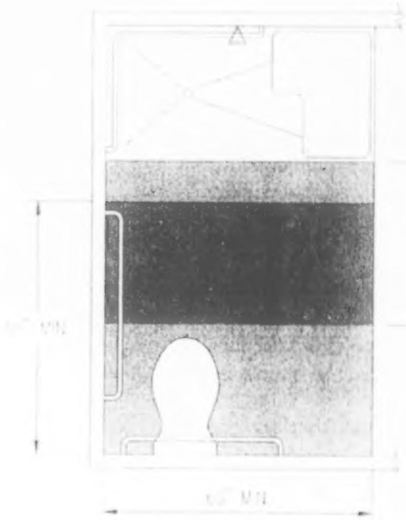
Bathrooms

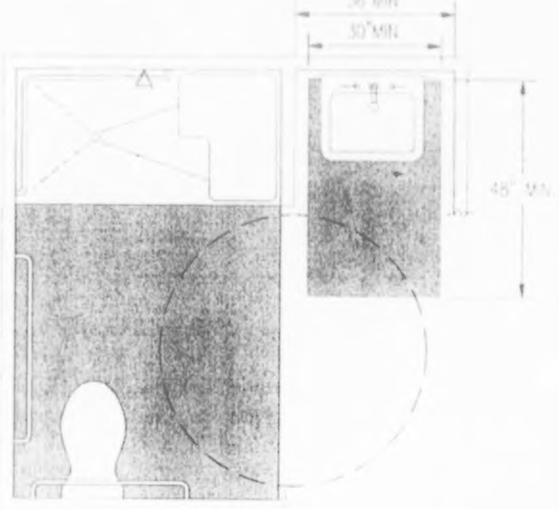
An accessible bathroom can be equipped with either a tub or shower (transfer or roll-in).

Example of a Single-User Bathroom (with Roll-In Shower)

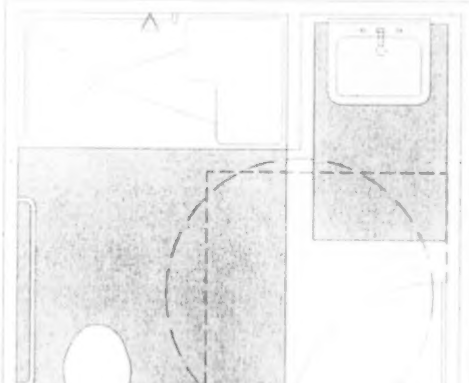
Clear space required at any fixture can overlap required clear floor spaces, turning space, and door maneuvering space. Since wheelchair access precludes curbs at roll-in showers, the shower area and clear floor space can be used for turning. *Recommendation:* Consider providing turning space outside the shower so that people using wheelchairs do not have to travel on wet surfaces every time they use the room.

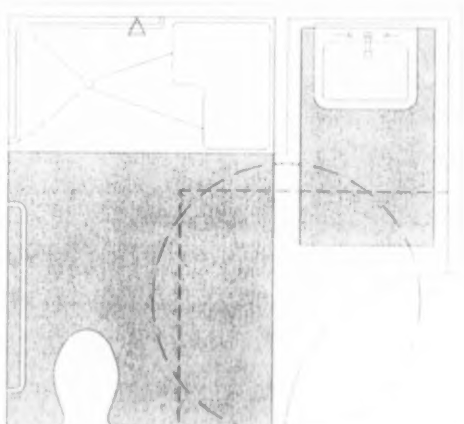
Where clear floor space at a lavatory is obstructed on both sides more than 2 feet, a clearance at least 36 inches wide is required.





The designs below facilitate access by providing turning space as well as side transfer space at the shower seat and the toilet. The door cannot swing into the clear floor space required at accessible fixtures.





Sinks [4.24]

ADAAG provides technical specifications for both "lavatories" and "sinks." Requirements for lavatories in ADAAG 4.19 apply to fixtures for hand washing in toilet or bathing facilities. Fixtures provided for other purposes, such as dish washing, are considered "sinks." ADAAG provides technical requirements for sinks but does not provide scoping requirements. However, access is important to sinks that serve a public or common use purpose.

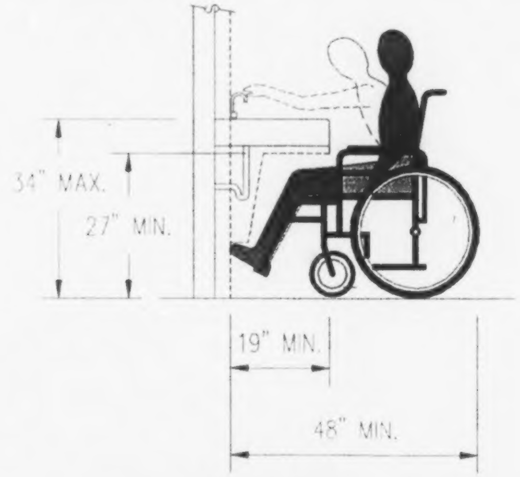
Recommendations: A forward approach (specified in 4.24) provides convenient access at sinks used regularly or for extended periods of time. At those used briefly or intermittently, a side approach may be sufficient. A removable base cabinet can be used to make a sink adaptable for a forward approach. Sinks that are located in employee work stations and used only by employees, are not required to be accessible, although access or adaptability can facilitate accommodation of employees. Where multiple sinks are provided in a space (e.g., laboratory classrooms), access to at least one or 5% in each such space is generally sufficient.

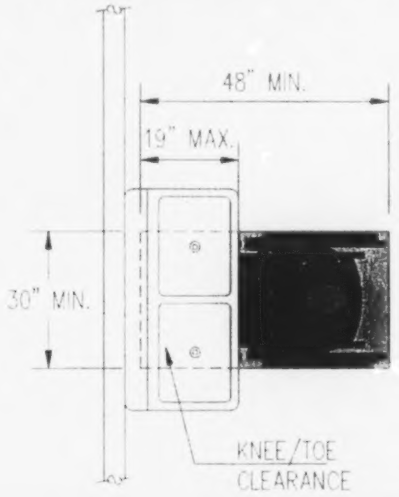
Examples of Recommended Level of Access at Sinks

Forward Approach (Compliance with 4.24)	Side Approach	Access (or Adaptability) Optional
classrooms, art studios, laboratories used for instruction, and similar public/common use areas	employee break rooms *(forward approach access or adaptability preferred)*	janitor's sinks laboratories for employees only (not students)
kitchens in apartment-style dormitories	hotel/motel kitchenettes *(ADAAG 9.2.2(7))*	restaurant kitchens

Forward Approach

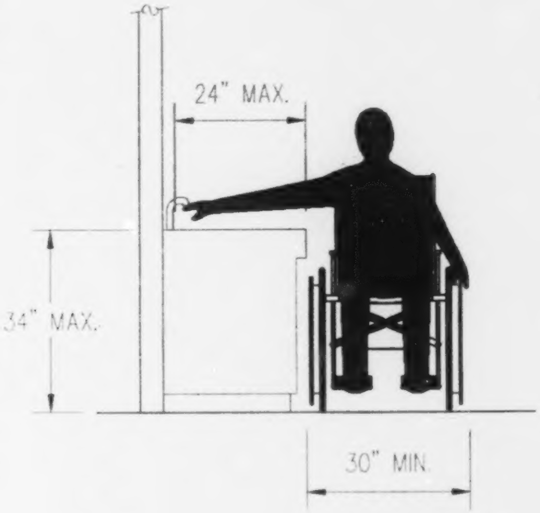
Knee and toe clearances specified for lavatories in 4.19, which recognize space for plumbing (see page 75), can be applied to sinks. Where disposals are provided, rear corner placement will allow greater knee clearance. Faucets, controls, and dispensers should be within the usable clear floor space to be within easy reach.

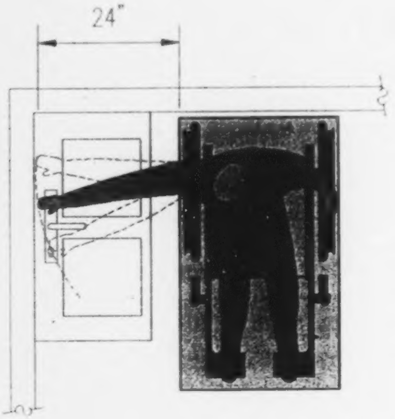




Side Approach

Side reach depth is important to consider in the design and location of sinks. Sinks located in corners may not be fully within reach and the space to the rear of the side approach space cannot be reached.





Storage [4.25]

Scoping [4.1.3(12)]

ADAAG covers fixed or built-in storage facilities in public or common use spaces and requires access to at least one of "each type." "Type" refers to the design of the element (shelving, cabinets, closets) as well as the intended use (coat closets, supply closets). Additional storage elements of the same type are not required to comply; for example, if above-counter cabinets are provided, only the lowest shelf of one such wall cabinet need be accessible. Shelves and display units allowing self-service by customers in mercantile occupancies are not required to comply with this section but are required to be on an accessible route. However, at least half of all self-service shelves in restaurant and cafeteria food service lines are required to be accessible in ADAAG 5.5.

Work Areas

Storage facilities used by employees for purposes other than job-related tasks, such as break room cabinets and shower room lockers, are required to be accessible. Those used only by employees at a work station (janitor closets) or as part of a work area (stockroom shelves) are not required to comply (although work areas must be on an accessible route for approach, entry, and exit as required in 4.1.1(3)). *Recommendation:* Accessible or adaptable storage facilities however may be advisable in facilitating accommodation of employees with disabilities.

Lockers

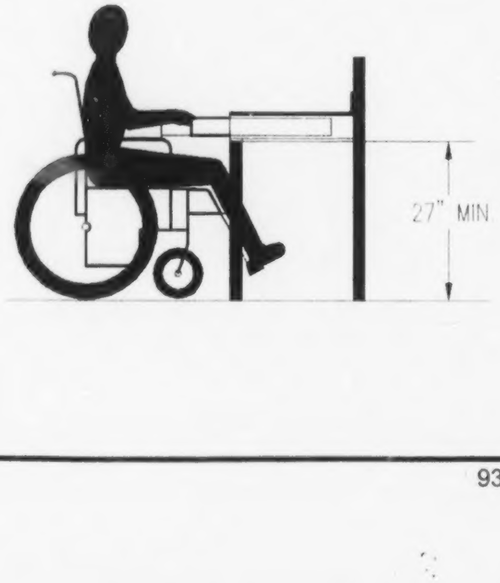
Lockers, although not specifically referenced, are a type of storage facility required to be accessible in public or common use facilities. *Recommendations:* In health clubs and gyms where a large number may be provided, consider a minimum of 5% instead of "at least one" of each type. Where only a limited number of lockers are accessible, identifying those that are accessible with the access symbol is helpful.

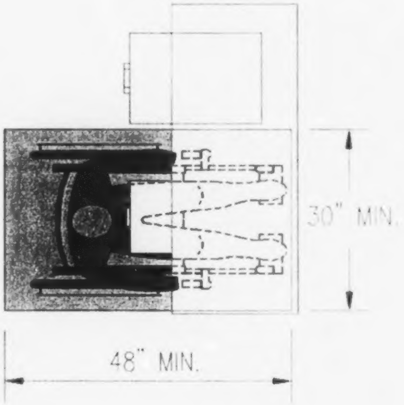
Self-Service Storage Facilities

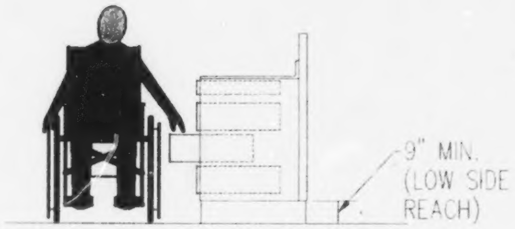
Self-service storage facilities are not specifically addressed by ADAAG but where they are provided for rent by the public, access must be provided. *Recommendation:* Access to at least 5% of each type is recommended.

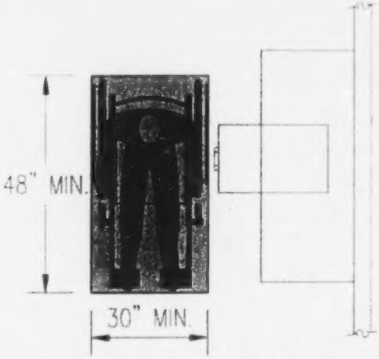
Clear Floor Space [4.25.2] and Height [4.25.3]

Clear floor space for either a forward or side approach is allowed. However, since people who use wheelchairs may not be able to reach beyond the toes, a forward reach is generally limited to those storage elements providing knee and toe clearances. Otherwise, space must be provided for a side approach.

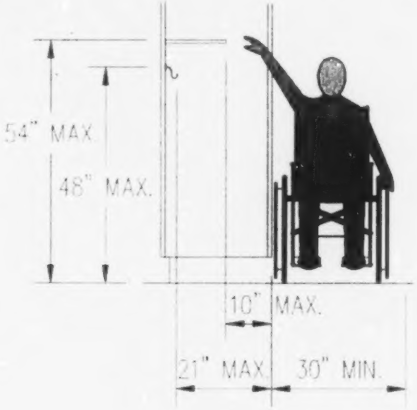





9" MIN.
(LOW SIDE
REACH)


48" MIN.
30" MIN.

A side reach is also necessary at cabinets, lockers, and shallow closets. Space for a side approach is also helpful since the side reach is higher and lower than the forward reach. ADAAG specifies maximum reach heights according to the depth of reach (see page 19).


54" MAX.
48" MAX.
10" MAX.
21" MAX.
30" MIN.

Hardware [4.25.4]

Hardware should be exposed (as required for sliding doors in 4.13) and must:

- be automatic or operable with one hand
- operate without tight grasping, pinching, or twisting of the wrist
- require no more than 5 lb force to activate

Handrails, Grab Bars, and Tub and Shower Seats [4.26]

ADAAG 4.26 provides technical requirements for:

- handrails at ramps [4.8] and stairs [4.9]
- grab bars at water closets [4.16], toilet stalls [4.17], bath tubs [4.20], and showers [4.21]
- tub and shower seats.

Size and Spacing of Grab Bars and Handrails [4.26.2]

Use of a grab bar or handrail requires the formation of a power grip so that thumb and fingers can be opposed and the surface of the palm can be in maximum contact with the bar or rail surface. Large sections, particularly those of rectangular design, are not as graspable as small circular sections. A gripping surface with a diameter between 1¼ to 1½ inches is specified. Alternate shapes are permitted that allow a similar opposing grip. Standard IPS pipe designated as 1¼ to 1½ inch is acceptable. *Recommendation:* Consider a 1¼ inch specification for pipe since a 1½ inch specification may result in an outer diameter close to 2 inches.

The 1½ inch clearance between walls and handrails or grab bars is an absolute dimension; it provides knuckle clearance while generally disallowing entrapment of the forearm or elbow.

Wall-mounted objects, such as towel racks and dispensers, can interfere with the use of grab bars if placed above grab bars. A minimum 18 inch vertical clearance (specified for recessed handrails) may place elements above maximum reach heights.

Eliminating Hazards [4.26.4]

Handrails, grab bars, and adjacent surfaces cannot have any sharp or abrasive elements. Extensions must be rounded or returned to the walls, floors, or posts. Extensions with bottom edges within 27 inches of the floor are detectable within the standard sweep of canes.

Controls and Operating Mechanisms [4.27]

Scoping [4.1.3(13)]

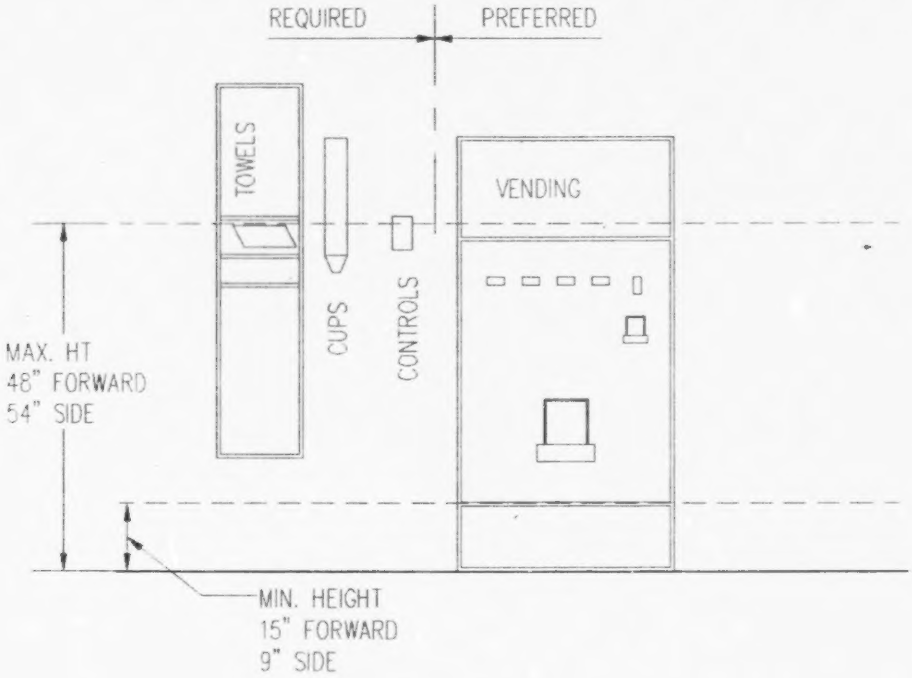
ADAAG covers elements that are fixed or built-in, including those bolted to floors or walls. Compliance is recommended for free-standing equipment, such as vending machines. Controls and operating mechanisms intended for use only by employees for job-related tasks are not required to comply (although compliance will help accommodate employees). The following life safety elements illustrate the coverage of this section:

element	compliance
alarm pull stations	required as fixed element for common use by building occupants
fire extinguisher cabinets	required for the fixed portion (cabinet); recommended for the non-fixed portion (extinguisher) where possible
alarm command stations	not required since they are used only by employees or trained emergency personnel

Clear Floor Space [4.27.2]

Clear floor space for a forward or side approach is required at controls, dispensers, receptacles, and other operable equipment as specified in 4.2; those recessed within niches or alcoves may require additional maneuvering space depending on the recess depth (see page 17). *Recommendation:* Operable parts approximately centered on the clear floor space are generally easier to reach.

Height [4.27.3]
The operable portions of controls and operating mechanisms must be within established reach ranges for either a forward or side reach as required in 4.2.5 and 4.2.6 (see pages 18 and 19). Note the reduced maximum height for reaches over obstructions beyond certain depths. This is important where controls and switches are mounted on walls above counters. The maximum reach height pertains to the highest operable portion of controls and operating mechanisms and includes coin slots or credit card slots.



Electrical outlets must be at least 15 inches high. Connections for equipment not intended for regular use by building occupants, such as receptacles for wall-mounted clocks and refrigerators, are not required to comply.

Operation [4.27.4]
Controls and operating mechanisms must:

- be automatic or operable with one hand
- operate without tight grasping, pinching, or twisting of the wrist
- require no more than 5 lb force to activate

Mechanisms that can be operated with a closed fist will generally satisfy these criteria.

Alarms [4.28]

Scoping [4.1.3(14)]

ADAAG requires both audible and visual alarms in facilities that have emergency warning systems whether building-wide systems or self-contained units are provided. Unlike most building or life safety codes, ADAAG does not require an emergency system but requires compliance where one is provided. In alterations, this requirement applies where a new alarm system is installed or an existing system is replaced or upgraded; the degree of compliance is determined by the scope of work and technical feasibility.

Medical Care Facilities

Requirements for alarms may be modified in medical care settings according to standard industry practice. In many health care facilities, personnel responsible for ensuring the safety of patients respond to intercom messages or other signals not intended to alert or alarm patients incapable of independent evacuation. Under industry practices, a supervised emergency response plan is essential and generally does not include installation of alarms in patient rooms and wards.

Audible Alarms [4.28.2]

Sound levels are specified in this section to benefit people who have a hearing impairment. The sound of the alarm must be able to be distinguished above and apart from the prevailing sound level within the space. *Recommendation:* Alarms with a periodic element to the signal, such as single stroke bells, hi-low, and fast whoop, are considered more effective than those with continuous or reverberating tones. Consider a signal with a sound characterized by three or four pure tones without much "noise" in between.

Visual Alarms [4.28.3]

In general, it is not sufficient to install visual signals only at audible alarm locations. Audible alarms installed in corridors and lobbies can be heard in adjacent rooms but a visual signal can be observed only within the space it occupies. Visual alarms are required in hallways, lobbies, restrooms, and any other general usage and common use areas, such as meeting and conference rooms, classrooms, cafeterias, employee break rooms, dressing rooms, examination rooms and similar spaces. Visual alarms are not required in areas used solely as employee work areas or in mechanical, electrical, or telephone closets, janitor's closets, or similar non-occupiable spaces. The technical requirements apply to single-station and building-wide alarm systems and are based in part on research sponsored by the Access Board as well as Underwriters Laboratories (UL). The requirements do not preclude use of zoned or coded alarm systems.

Strobe Type and Color

Research indicates high-intensity xenon strobe lamps to be the most effective and white light the most discernible. Colored lamps, particularly red, were found to be ineffective even at very high intensities.

Pulse Duration and Flash Rate

Visual alarm strobes produce a repetitive burst of high-intensity light. The repetition of this pulse at a regular interval is the flash rate. Pulse duration is the interval of the flash between signal build-up and decay and is limited as specified so that the signal is not temporarily blinding. A flash rate cycle between one to three Hz (flashes per second) is required based on research results.

Recommendation: Flash synchronization is an important consideration. Multiple strobes within a space, if not synchronized, can produce a composite flash rate in excess of 3 Hz. For example, two strobes set at 3 Hz in a room could generate a combined flash rate of 6 Hz. Flash rates above 5 Hz may trigger seizures in people with certain forms of epilepsy. This is a particular concern in schools, since children frequently are more affected by photosensitivity than are adults. In spaces with multiple strobes, composite flash rates above 5 Hz should be avoided by synchronizing or decreasing the flash rate. It may also be possible to decrease the number of strobes or increase the spacing between them by increasing their intensity.

Intensity

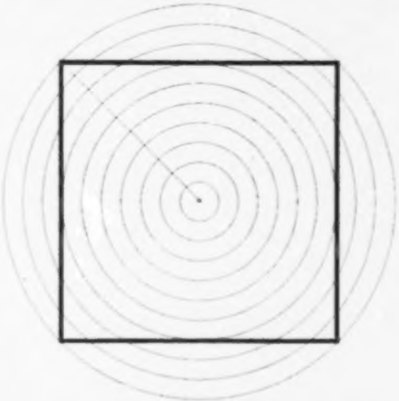
To be effective, a visual signal (or its reflection from adjacent walls and ceiling) must be of an intensity that will raise the overall light level sharply, but not be so intense as to be unsafe for direct viewing when installed at a specified mounting height. Lamp intensity is given in effective candela (cd), measured in use at the source. In research testing, 90% of subjects were alerted by a 75 cd signal mounted 50 feet away on the wall directly behind them.

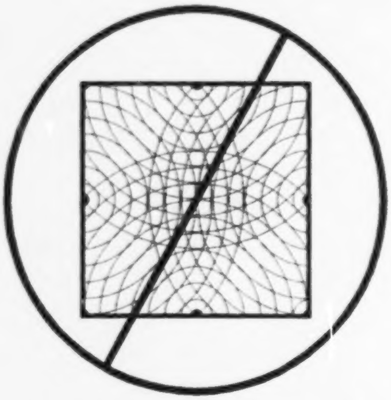
Mounting Height

ADAAG specifies a signal height 80 inches above the highest floor level within the space or 6 inches below the ceiling, whichever is lower. (This can be measured to the centerline or to the bottom edge of the appliance). The 80 inch height is based on research indicating it to be the most effective for a 75 cd lamp. It is also consistent with the minimum headroom clearance required for protruding objects. However, photometric calculations of lamp intensity for mounting heights of 80 and 96 inches show only nominal differences and can be practically considered to be equivalent. In multi-purpose facilities where bleacher seating, athletic equipment, backdrops, or other moveable elements may at times be deployed or in libraries, convention centers and other building types where devices would not be visible when installed at the specified height, optimal signal placement may require study and the development of alternative intensity and placement calculations as an "equivalent facilitation" which permits departures from ADAAG specifications if equal or greater access is provided. What is most important is that strobes, whether projecting from walls or suspended from ceilings, be at least 6 inches below the ceiling plane to minimize smoke obscuration.

Location and Spacing

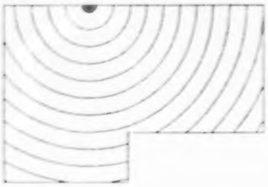
Rooms with an area than can be circumscribed by a circle 50 feet in radius can be covered by a single centrally located strobe of 75 cd. For very small rooms, such as examination, toilet, and dressing rooms, a single strobe of lesser intensity may well be sufficient as an equivalent facilitation.

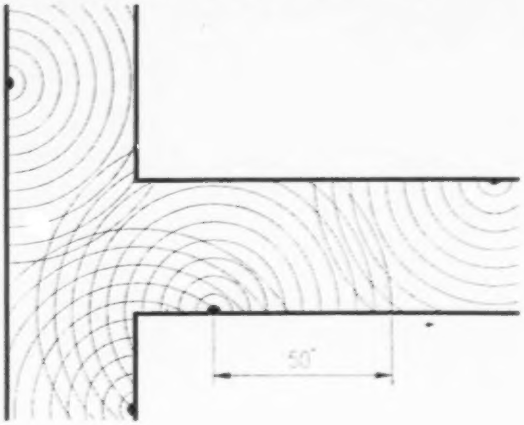




Recommendations: In general, it is recommended that lamp intensity and spacing be maximized to allow the minimum number of fixtures within a room or space. Large high-ceilinged spaces may be best served by suspended flash tubes of very high intensity. (Lamps up to 1000 cd are available for such applications). Specifiers may be motivated to standardize on a minimum-candela fixture because they are less expensive to purchase and connect, more available, and simplify inventorying. This can lead to close spacing of low-intensity lamps, which is discouraged because of the effect of composite flashes on people with photosensitivity. It may be possible to serve some large rooms or corridor sections with a single appliance located on a perimeter wall or suspended below the ceiling so that the signal can spread throughout the space without obstruction by furnishings, equipment, or room geometry.

Provisions for the spacing of visual alarms in hallways and corridors generally require one fixture every 100 feet. *Recommendations:* In long corridors, such as in shopping malls and airport terminals, appliances should be spaced to minimize their number and the effect of a composite flash rate. Alternate placement between opposing corridor walls is recommended in minimizing the number of signals in a field of view. Particular care should be taken in locating lamps along window or storefront glazing that may intensify the flash rate due to reflection.





Auxiliary Alarms [4.28.4]

A portion of sleeping units in transient lodging facilities, including those required to be accessible to persons who use wheelchairs, must have a visual alarm connected to the building alarm system or have an outlet for a portable device. Portable devices must be capable of being triggered by the building emergency alarm system. Appliances connected to the building system, where permitted by code, can be monitored by the building fire alarm system. Portable units have to be activated by a signal from the central alarm control system transmitted to a receiver plugged into an electrical outlet. Note that there are operational considerations in making portable appliances available on an as-needed basis. Where portable devices are used, it is important that the appliance be checked to make sure it is functioning properly, and that correct and appropriate connections and placement are made, a responsibility which should not be left solely to guests or tenants who need the device. Because guest rooms sizes are not large, it is required only that the signal, which is intended to alert persons who are awake, be visible in all areas of the room or unit.

A visual signal is also important for single or multiple-station smoke detectors where provided in sleeping rooms or suites. A single appliance can be used to provide notification of the building system alarm and the room smoke detector alarm so long as the activation of the room's smoke detector does not activate the building alarm system.

Detectable Warnings [4.29]

People with little or no usable vision use environmental cues for safe and independent travel. These cues may include ambient sounds, edges and other physical elements that can be sensed by using a cane, and texture changes underfoot. Curbs are an important cue. Where curbs are lacking, such as at curb ramps, vehicle drop-offs, and depressed corners at intersections, people with vision impairments may not be able to discern the boundary between pedestrian and vehicular areas. ADAAG originally required detectable warnings on curb ramps, at areas where walking surfaces blend with vehicular ways without curb separation, railings, or other elements, and at the edges of reflecting pools not protected by railings, walls, or curbs.

Temporary Suspension

In response to business and user concerns about the need for the detectable warnings specified in 4.29 at curb ramps and hazardous vehicular areas, the Access Board suspended the requirement pending further study. This suspension is in effect until July 26, 1998; extension of this suspension to July 26, 2000, has been proposed. This suspends the requirements for detectable warnings at:

- curb ramps [4.7.7]
- hazardous vehicular areas [4.29.5]
- reflecting pools [4.29.6]

Detectable warnings are not prohibited by this suspension; jurisdictions may continue to install the truncated domes specified in ADAAG or other surfaces or technologies if they wish but are not obligated to do so. (If a requirement for detectable warnings is re-instituted after the suspension, it would apply to new construction or alterations occurring after re-instatement and not apply retroactively to work undertaken during the period of suspension).

Transit Facilities: Rail Stations

Much of the early research on detectable warnings was conducted at rapid rail stations and the requirement to provide a detectable warning remains in effect along platform edges in transit stations [10.3.1(8)]. It applies to new and altered rapid, light, commuter, and intercity rail stations. Detectable warnings are also required in existing "key" stations serving rapid, light, and commuter rail systems and all existing intercity rail systems by dates specified in regulations issued by the Department of Transportation.

Platform Edges

The detectable warning must be placed at the platform edge and extend the full platform length in a 24 inch depth. This depth is an absolute dimension, not a minimum. Some platforms are edged with a buffer material that is designed to break away if hit by cargo trains. This material extends beyond the normal vehicle envelope. Where this breakaway material is installed at a platform edge, the width of the detectable warning surface can begin at the edge of the breakaway material rather than at the edge of the platform; otherwise, the detectable warning must extend to the edge of the platform. Since the sway of some rail cars may overlap a platform edge, the area of the detectable warning installation should not be considered a safety zone but rather an indication of an adjacent drop-off or platform edge. Where there is no specific edge to a vehicle boarding area, the detectable warning should be placed at the boundary of the vehicle dynamic envelope.

Equivalent Facilitation

The provision of equivalent facilitation in ADAAG 2.2 permits departures from ADAAG requirements that provide equal or greater access. The Department of Transportation's ADA regulations establish a procedure through which an agency or manufacturer may apply for a determination of equivalent facilitation for alternative designs or technologies. The Department, in consultation with the Access Board, has granted equivalent facilitation for a design similar to the ADAAG specification but having a dome base diameter of 1.325mm and a spacing of 2.8mm.

Doors to Hazardous Areas (Reserved) [4.29.3] and Stairs (Reserved) [4.29.4]

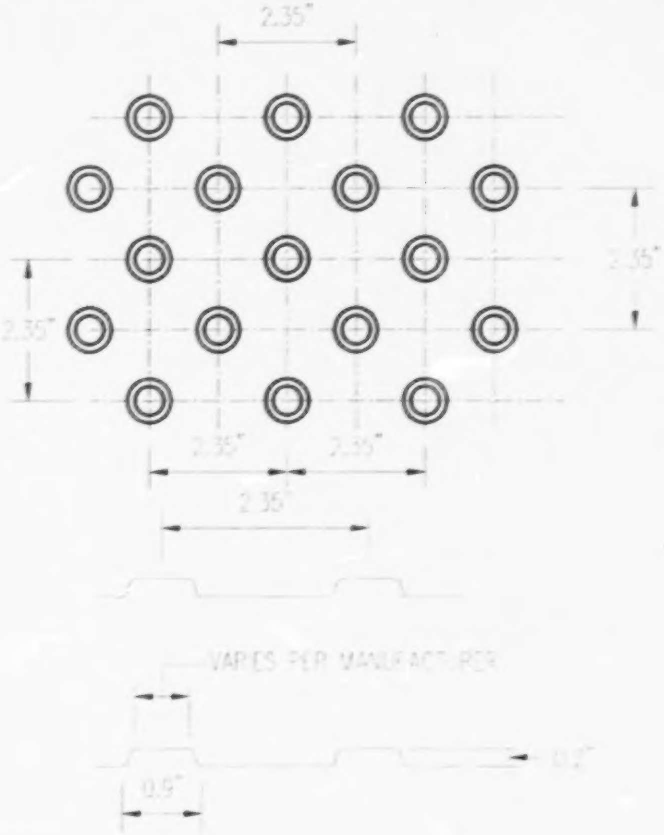
In the absence of a clear consensus on the need or specification for detectable warnings at doors and stairs, no requirement has been specified in ADAAG. Earlier accessibility standards once contained a requirement for these areas.

Detectable Warnings on Walking Surfaces [4.29.2]

Detectable warnings are intended to alert pedestrians of an imminent hazard but are not designed as wayfinding devices. Research indicates that the most effective detectable warning:

- has a unique texture distinct from other common surfaces in the environment
- adjoins or abuts the hazard to signal impending change
- extends beyond the average stride length so that one can detect, understand, and react to it before encountering the hazard

The truncated dome specification and intended offset pattern was found to be the most effective in providing a distinct patterning detectable by cane and underfoot. The degree of truncation, which is not specified, varies according to the manufacturer.



Contrast

Interior applications require that the warning feature provide contrast in resilience or in sound when sensed with a cane. The domes and their matrix must also offer a strong visual contrast to adjacent pedestrian surfaces. *Recommendation:* Although ADAAG does not specify values for light-on-dark or dark-on-light contrast, a minimum 70% light reflectance contrast is recommended.

Signage [4.30]

The Society for Environmental Graphic Design (SEGD) has prepared guidance in applying ADAAG signage requirements based on certain industry conventions. This information is contained in a "White Paper" available from SEGD. Some of this information has been included here with permission.

Scoping [4.1.2(7), 4.1.3(16)]

Specifications for signage apply according to the type of sign provided. ADAAG does not require building signage except to identify certain accessible elements and spaces.

Tactile Signage

Raised and Braille characters are required on signs that "designate permanent rooms and spaces." This is intended to cover signs typically placed at doorways (i.e., room and exit labels) because doorways provide a tactile cue in locating signs. (Other types of signs that can be placed variously along circulation routes may not be easily found by people with little or no vision.) The requirement for raised and Braille characters also applies to signs labeling rooms whose function (and thus designation) is not likely to change over time. Examples include signs labeling restrooms, exits, rooms/floors by number or letter. *Recommendation:* Tactile signs are recommended for room names not likely to change.

Requirements for tactile signage apply to exterior sites but are not intended for building names (except at rail stations) or addresses.

Non-Tactile Signage

The legibility of printed characters is a function of the viewing distance, character height and proportion, font, and the color contrast between character and background, the finish, and the lighting. Specifications for character size and proportion and sign finish and contrast apply to signs providing information about a room or space ("Employees Only"), direction to rooms, spaces and building elements, labeling not required to be tactile of elements and rooms ("Service Entrance"), rules of conduct, and overhead signs.

	TACTILE	NON-TACTILE
Character Proportion Font/ Style	raised characters: · sans or "simple" serif · upper case only	· width-to-height ratios for character & stroke · lower case allowed
Character Height	· raised characters: 5/8" - 2" (raised 1/32" min.)	· based on viewing distance · 3" min for overhead signs
Braille	· grade II required	N/A
Pictograms	where provided: · 6" min. field height · raised & Braille verbal description below (pictograms are not required to be raised)	access symbols required by ADAAG: · specified content · color contrast (other types not covered)
Finish & Contrast	· light/dark contrast · non-glare finish	· light/dark contrast · non-glare finish
Location	· 60" height to centerline on wall at latch side of doors	· 80" min. vertical clearance for overhead signs

Temporary Signage

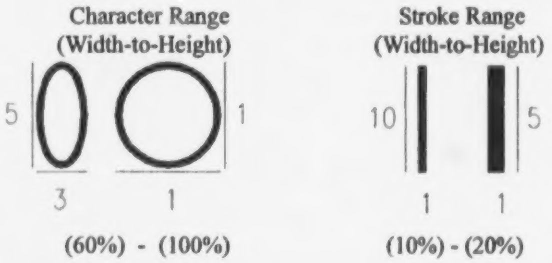
Temporary signs, which are exempt, include identification of tenancies, names and titles of room occupants, non-fixed signage and temporary postings ("Out of Service," "Under Renovation"), and other information subject to change (building directories, posted menus, hours of operation).

Pictograms

Pictograms can improve access for people with cognitive or learning disabilities, children, and others who may have a limited reading ability. ADAAG however requires the display of certain symbols to label various accessible spaces and features [4.30.7]. Requirements for tactile text apply to pictograms used to label "permanent" rooms and spaces (e.g., restrooms) where provided. Pictorial symbols used for other types of signs (e.g, no smoking, occupant logos) are not addressed by ADAAG.

Character Proportion [4.30.2]

Very thick or thin characters and character strokes can be difficult to read. *Recommendation:* While ADAAG does not specify the character to use in calculating proportions, SEGD recommends the capital "O" and number "0" for character proportion and the capital "I" and number "1" for stroke proportion as adequately representative of letterforms.



Recommendations: Styles with "simple" or no serifs (required for raised letters) are preferred over styles, such as script or old English, that can be difficult to read. Consider uniform stroke widths which can make signs easier to read.

Character Height [4.30.3]

Characters must be sized according to the viewing distance although a minimum 3 inch upper case or capital letter height is required for overhead signs (i.e., above 80 inches for adequate headroom).

Recommendations: Both the horizontal and vertical viewing distance should be considered. The viewing location upon which calculations are based may be difficult to pinpoint in long corridors and large rooms. SEGD recommends a minimum 75 feet viewing distance for such areas. Traffic patterns and sign function may also be important factors to consider. Consider a minimum 1 inch cap height for every 25 feet of viewing distance (horizontal) with 5/8 inch the minimum as recommended by SEGD. Further guidance is also available from the CABO/ANSI A117.1-1992 standard which recommends heights based on the mounting height (1 inch minimum height for signs mounted from 48 to 60 inches above the floor and a 2 inch minimum for those above 60 and below 80 inches).

Raised and Brailled Characters and Pictorial Symbol Signs [4.30.4]

Raised characters are required to have simple, preferably no, serif. Fancy serif styles make tactile reading difficult. *Recommendations:* Raised borders can confuse tactile reading of raised (and Braille) characters. They should be avoided or spaced away from raised text.

SANS	**SIMPLE**	*AVOID*
serif	serif	fancy serifs

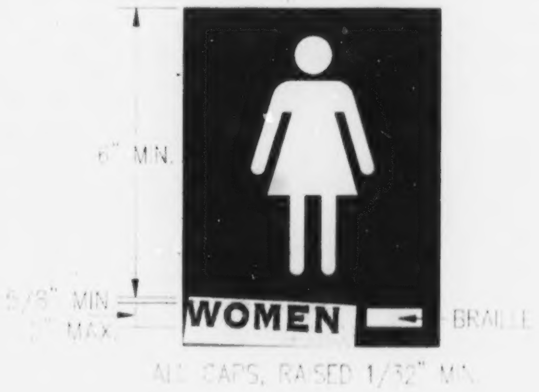
Braille is read with a light sweeping touch using the pad of the finger, not the tip. It is important that the vertical projection of dots be rounded, not straight (i.e., mounds, not cylinders).

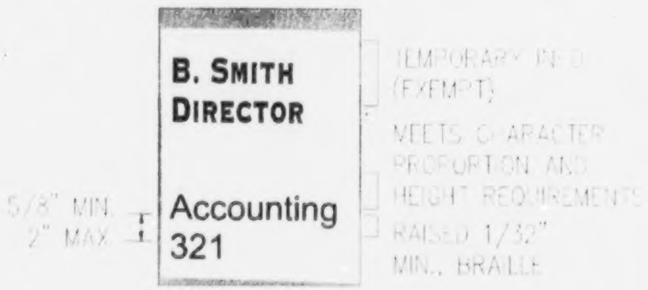
Recommended Braille Specifications	
nominal height	0.019 in
nominal base diameter	0.057 in
nominal distance (center to center) of adjacent dots in same cell	0.092 in
nominal distance (center to center) of corresponding dots in adjacent cells	0.245 in
nominal line spacing of Braille cells (center to center of nearest corresponding dots in adjacent lines)	0.400 in

(Source: specification #800, National Library Service, Library of Congress)

Grade II Braille is different from literary Braille by using standard word contractions. A character symbol is used to distinguish numbers from letters since the same characters are used for both. Similarly, a character symbol is used to indicate capitalization. *Recommendations:* Capitalization should be used for the first letter of proper nouns and names but not for "restroom" or "exit." Unlike raised letters, Braille is not provided in all caps (which would require the capital symbol before each letter). Braille is usually located below or beside raised characters. Consistency within a building system is the important thing. If placed below (flush left or center), it is important that it be spaced far enough away from raised characters (and borders) so that fingers can be flush with the sign face.

Where pictograms are used to label "permanent" rooms and spaces (e.g., restrooms), the verbal equivalent must be provided in raised and Braille characters. This does not apply to pictograms providing information about a room or space, including the access symbol. Since pictogram symbols vary in their shape and proportion, a minimum size is specified for the background, which in effect governs symbol size. The minimum height (6 inches) applies to the symbol field, excluding raised and Braille text. Pictograms are not required to be raised but must meet requirements for finish and contrast.





Finish and Contrast [4.30.5]

All signs covered by 4.30 must have a non-glare finish, such as matte or eggshell. *Recommendations:* An eggshell finish is recommended. Consideration should also be given to light sources and the ambient lighting to prevent glare on sign surfaces. Examples of acceptable and unacceptable finishes, according to SEGD, include:

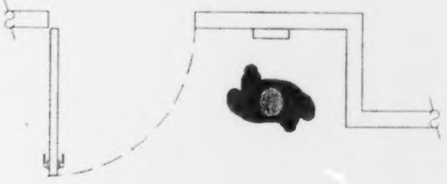
Material	Acceptable	Unacceptable
finish paints and inks	eggshell, matte	gloss or semi-gloss
acrylic sheet, mylar, frosted glass	most non-glare types	polished surface
self-adhesive vinyl film	most non-glossy types	glossy
metal	certain satin or random brushed finishes	polished or directional brushed finishes

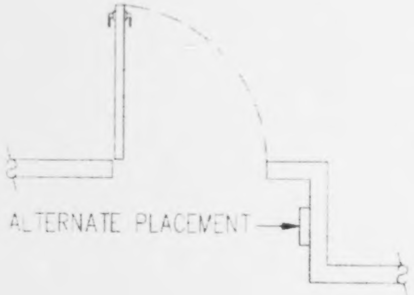
Recommendations: Light characters and symbols on a dark background are generally considered easier to read than dark-on-light (either is allowed). A contrast of at least 70% based on the light reflectance value is recommended.

Mounting Location and Height [4.30.6]

Placement of tactile signs aside doors (latch-side) provides safety since locating signs on doors that swing out is hazardous. It also provides uniformity which makes signs easier to find by people with little or no vision. (This is why tactile signs are not permitted on doors that swing-in). The 60 inch centerline height also provides uniformity as well as convenience in reading signs from a standing position. *Recommendation:* At signs containing pictograms or other non-tactile information, this should be measured to the centerline of the raised/ Braille portion so that it is not too low (or high).

Space must be available for a close approach outside the swing of doors. It is important that fixed elements (e.g., drinking fountains) and furnishings not obstruct the approach. The wheelchair maneuvering clearance required on the pull side of doors should allow adequate space.





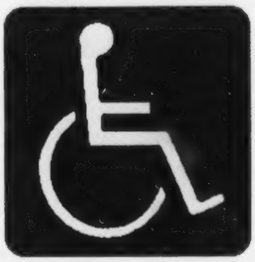
Where adequate wall space is not available on the latch-side, signs are to be placed on the nearest adjacent wall surface. At double doors or entries with no doors, signs can be placed on either side although attention should be paid to predominant traffic patterns and building-wide uniformity. At double doors, doors that easily swing back 180 degrees can be a hazard unless doors are equipped with closers or the sign is placed beyond the full swing. Where other codes or standards specify a different location (e.g., illuminated exit signs overhead) redundancy is required.

Symbols of Accessibility [4.30.7]

ADAAG requires several types of access symbols. Color contrast between symbols and background is required but the color or size is not specified. *Recommendations:* Consider using:

- light-on-dark, which is considered more effective than dark-on-light
- contrast of at least 70 % (light reflectance value)
- non-glare finishes
- system-wide uniformity

The International Symbol of Accessibility is used to label accessible:

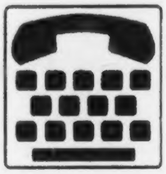


- parking spaces
- check-out aisles [7.3]
- areas of rescue assistance (and directional signage at inaccessible exits and on routes to areas of rescue assistance)

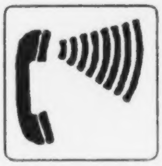
and, unless all are accessible:

- passenger loading zones
- public entrances (and directional signage at inaccessible entrances)
- toilet and bathing facilities (and directional signage at inaccessible locations)

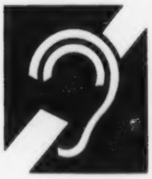
Other required symbols include.



used to identify the location of text telephones (TTYs), including on directional signs required at banks of telephones without TTYs



used to identify phones equipped with volume control



used to indicate the availability of assistive listening systems in assembly areas (can also be used to provide notice of other auxiliary aids and services such as real time captioning, sign language/oral interpretive services)

Illumination Levels (Reserved) [4.30.8]

Recommendations: Due to variations in field conditions, illumination levels are not specified in ADAAG. A level from 10 to 30 footcandles is recommended uniformly over the sign surface. Signs should be located so that the level on the sign surface is not significantly exceeded by ambient light or bright lighting behind or in front of the sign.

Telephones [4.31]

Scoping [4.1.3(17)(a) & (b)]

ADAAG addresses public telephones (pay, closed circuit) that are fixed and requires access for people who use wheelchairs and for people who are deaf, hard of hearing, or who have speech/language impairments. Phones with modular jacks are not addressed by ADAAG.

Wheelchair Access

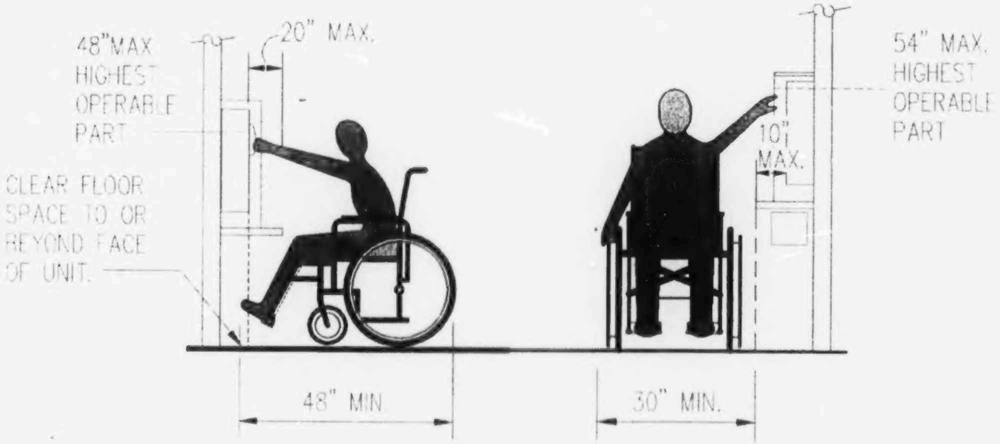
A wheelchair accessible public phone is required at all interior and exterior pay phone "banks" (i.e., two or more adjacent phones). If phones are installed as single units, one per floor must be accessible. *Recommendation:* For exterior units, access is recommended at each pay phone or location, especially where the distance between phones is considerable (i.e., over 200 feet).

Clear Floor or Ground Space [4.31.2], Mounting Height [4.31.3]

Generally, access can be provided with either a forward or side approach. Where multiple banks are provided on a floor (or exterior site), at least one accessible phone must provide a forward approach (considered more convenient in the use of phones).

Forward Approach

Clear floor space is required to the face of the unit; a portion can be provided below the unit where clearance is available for toes/knees. (Since the seated forward reach does not extend far beyond the toes, knee space can make it easier to reach to the phone).


48"MAX HIGHEST OPERABLE PART
20" MAX.
CLEAR FLOOR SPACE TO OR BEYOND FACE OF UNIT.
48" MIN.
54" MAX. HIGHEST OPERABLE PART
10" MAX.
30" MIN.

Side Approach

The maximum reach depth for a high (54 inch maximum) reach is 10 inches, measured from the clear floor space.

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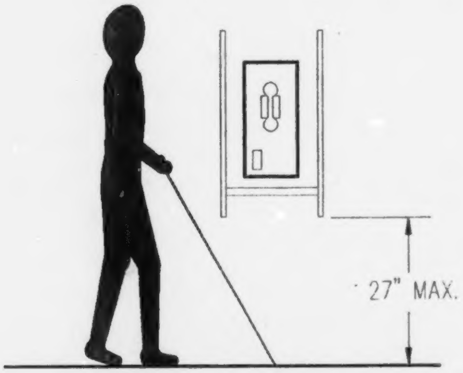
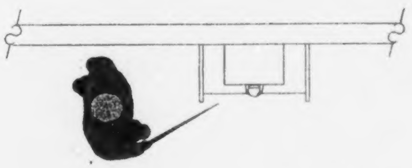
Protruding Objects [4.31.4]

Wall- or post-mounted pay phones and enclosures, due to their location above the standard sweep of canes (i.e., 27 inches high from the floor), can be a hazard to people with vision impairments. Telephone placement and enclosures must be designed and installed so that the telephone is not a hazardous protruding object. Enclosures with a bottom edge that is within 27 inches from the floor or ground are detectable by cane.

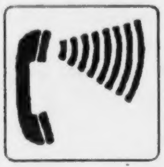




Hearing Aid Compatible and Volume Control Telephones [4.13.5]

ADAAG requires that wheelchair accessible public phones, including pay and closed circuit phones, provide a volume control and be hearing aid compatible. In addition, 25% of all other public phones are required to have a volume control. Phones with volume control must be dispersed among all public-use phones, including closed circuit phones, throughout the facility.

Phones made in or imported into the U.S. are compatible with hearing aids as a result of the Hearing Aid Compatibility Act of 1988. A compatible phone generates a magnetic field that can be "translated" by hearing aids with a "T" switch, which activates a telecoil. This normally results in a clearer signal than having the hearing aid reamplify the audible output of the handset. It is important that compatible phones be shielded or located away from other electromagnetic sources, which can interfere with the T-switch transmission.



Volume controls on pay phones are located in either the base or the handset and are built into the telephone instrument as purchased or leased from a vendor. Most are located in the base and operated by pressing a button or key. Volume controls located in handsets are often used in retrofitting existing phones. Telephones required to have a volume control must be identified by a sign containing a depiction of a telephone handset with radiating sound waves.

Text Telephones (or TTYs) [4.31.9]

What is a text telephone? ... a TTY? ... a TDD? These are different names for the same thing: it is a device that allows people with hearing or speech impairments to communicate over the telephone. Like computers with modems, TTYs provide some form of keyboard input and visual display output. Devices typically include an acoustic coupler for the telephone handset, a simplified keyboard, and a visible message display. Typed messages are converted into audible tones transmitted through the phone line to a receiving unit. Early models were known as TTYs (from their origin in teletype technology). Smaller, more portable versions developed later were called TDDs (telecommunications devices for deaf persons), a term still used on the signage symbol used to identify them. ADAAG refers to these devices as text telephones but the abbreviation "TTY" is preferred by most TTY users.

Using TTYs

Many TTYs are connected to phones by placing the handset in an acoustic coupler although a number of models connect directly to a standard analog phone line. On a TTY call, both parties must have a TTY. (Title IV of the ADA establishes a 24-hour relay service so that calls can be made through an intermediary when only one party has a TTY). Short words and sentences save time and many abbreviations and contractions are used. Certain conventions are standard, such as typing "GA" (go ahead) after each message; this tells the other person on the line to begin typing a response.

Recognizing a TTY Call

Where TTYs share a voice line, it is important that persons answering the phone know how to recognize a TTY call. A series of beeping tones is the most common signal (made when the person calling taps the keyboard space bar) but not all models emit this sound. Some models are equipped with voice announcers. Since there may not always be an audible cue by the caller, check to see if it is a TTY call when nothing is heard. (When a call is made through the TTY relay service, the service operator will indicate by voice that it is a TTY relay call.)

How TTYs Work: Transmission Codes

TTYs generate and receive text through tones similar to those of touch-tone phones. There are two standard codes for transmitting text: Baudot and ASCII. This is an important consideration when buying or specifying a TTY. TTY technology was standardized on Baudot (5-bit) codes in the 1960s while computer applications require an ACSII (8-bit) format. Baudot code has fewer characters and a slower transmission rate but will likely remain the standard for TTYs in the years ahead as ASCII dominates the market. ASCII, while faster than Baudot, provides more capability than necessary for TTYs and is susceptible to interruptions such as call waiting, transfers, and line noise. For this reason, telephone emergency services, such as 911 and similar fast-dial lines, must be compatible with Baudot. Many TTYs have an ASCII option. Also available are TTYs with Turbo Code, an enhanced Baudot code with a faster transmission speed employed automatically when used with other TTYs with this capability.

Public Pay Phones

As a design guideline, ADAAG primarily covers only fixed building elements. This is why it addresses TTY access only at public pay phones. Some pay phones that are card-operated incorporate TTY technology. Although ADAAG requirements apply only to fixed telephones, other requirements in the ADA require communication access. For example, the Department of Justice title III regulation requires public accommodations to provide TTYs on request when customers, clients, patients or participants are permitted to make outgoing calls on more than an incidental convenience basis.

Permanently Fixed vs. Portable TTYs

While TTYs are available in a variety of designs, including portable models, ADAAG requires TTYs to be permanently fixed at pay phones. This allows ready and independent access for people needing them. Portable TTYs provided on an as-needed basis cannot substitute for fixed devices except in certain limited situations as an "equivalent facilitation" where they can be made readily available (i.e., nearby pay phones) at all times that the public pay phones can be used. ADAAG gives the example of a hotel registration desk in the vicinity of pay phones staffed at all times. Portable devices can be used to provide access to desktop and residential-type phones under ADA requirements outside ADAAG. This includes access to phones in hospital and hotel rooms; (TTYs at hospital or hotel front desks will allow patients or guests using TTYs in their rooms to access in-house services).

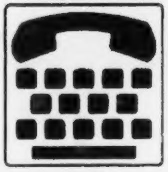
In new construction, TTY equipment can be provided as part of the pay phone contract with a phone company, independent pay phone provider, or route subcontractor. For existing installations, contact the phone service provider to add a TTY to an existing bank or to modify an existing pay phone enclosure with a shelf and power outlet to accommodate a portable device. Adding a shelf or power outlet or, where vandalism is not a concern, attaching a portable TTY next to an existing phone can also be done by a carpenter or construction contractor.

TTY Scoping [4.1.3(17)(c)]

ADAAG requires at least one TTY on site when there are four or more pay phones (and at least one is interior) and in specific buildings or locations when a pay phone is provided. In many cases, only one TTY-equipped pay phone is required on a site. *Recommendations:* From a practical standpoint, it would be considered good design to place additional units at some multi-facility sites or large buildings. For example, consider that a "site," as defined in ADAAG, can apply to an entire college campus, office complex, or shopping plaza. At sites with many buildings or long distances between phone banks, it is a good idea to provide TTYs at more than one location and, in some cases, at several locations. One should also consider a facility's use. ADAAG recognizes the importance of public access to phones in hospitals, airports, and transit stations but TTYs also may be advisable in other occupancies where public use of phones is equally important.

Location and Signage

ADAAG does not specify where text telephones are to be located on a site or in a building (except in hospitals, airports, and transit stations). It is best to locate them along primary circulation routes and in central or prominent phone locations so they are easy to find. Since not all phones or banks are equipped with TTYs, signage is important. Signs are required at all phone banks without TTYs indicating the location of the nearest TTY; (if there are no other banks, directional signage is required at building entrances. Additional signage, such as on building maps, is helpful too. Signs labeling pay phones with TTYs is required as well, in part because integrated TTYs may not be easily identified. An international symbol as specified in 4.30.7 is used on all TTY signs. ADAAG does not specify sign size, or in the case directional signs, verbal content, but requires a light-on-dark or dark-on-light color contrast between the content and the background and a non-glare finish.



Alterations

In general, ADAAG requires a text telephone where four or more pay phones are added or altered. This includes replacement of existing pay phones with units of different types, relocating existing pay phones, or installing new pay phones where none had previously been located. (Lowering existing pay phones for wheelchair access or replacing a non-functioning unit with one of the same type are not considered "alterations" that trigger the requirement for text telephones, although phone replacement may offer cost-effective opportunities to provide such access).

Shelf and Outlet

Some people travel with their own portable TTY units. ADAAG includes provisions for portable units shelves and power outlets at all banks with 3 or more pay phones. (Those who travel with laptop computers will also find these provisions useful). The shelf must provide a vertical clearance of at least 6 inches so that different types of portable TTY devices can be connected. *Recommendations:* A shelf at least 10 inches square will accommodate most models. Phones should have a standard handset so that they fit the typical TTY coupler. The power outlet must be in or adjacent to the telephone enclosure (typical TTY cord is about 3 feet long).

TTY Access at Wheelchair Accessible Phones

ADAAG includes specifications for wheelchair access to public phones. It is possible for a single unit to serve both people who use wheelchairs and those who use text telephones with careful design and placement of a standard TTY adjacent to an accessible pay telephone. However, if located below accessible units, the device may be too low for standing persons to use the keyboard comfortably or to see the display screen. They may also obstruct front approach knee space below phones for people using wheelchairs.

Selecting a TTY

Under ADAAG, TTYs can be permanently fixed within or next to phone enclosures. Pay phones with integrated TTYs are available. One model provides a vandal-proof metal drawer for attachment beneath a pay phone housing. The drawer containing the keyboard and screen automatically opens for use only when the call is answered by another TTY. Another model provides a coupler, screen, and keyboard within an enclosure than can be installed next to a wall-mounted pay phone. Portable devices can also be permanently secured within or next to telephone enclosures.

Vandal-resistant and weather proof TTYs are available for outdoor use, including at exterior-only sites such as highway rest areas and parks. (Since outdoor models were not available when ADAAG was first published, it does not currently address exterior installations but will likely do so in future updates.)

Recommendation: When buying or specifying a TTY to satisfy ADAAG or other ADA requirements, it is helpful to consider:

- **Power Supply** TTYs integrated with pay phones are permanently wired to the power system. Most portable devices require a standard 110 volt receptacle near the phone.

- **Display** Most TTYs use either a back lit LCD display or an LED display. The number of characters in the display at one time may vary from 1 line (20 characters) to 2 lines (80 characters). Since it can be difficult to write down information as it is read, the 2-line display can be helpful.

- **Connection to Phones and Phone Lines** When selecting a TTY with acoustic couplers, consider the design of telephone handsets. Most couplers are designed to fit standard rounded handsets like those usually found on pay phones. TTYs that connect directly to phone lines do not require coupling through the telephone handset. Where phone systems are digital, a special connector (digital-analog converter) is needed and can be obtained from a phone provider.

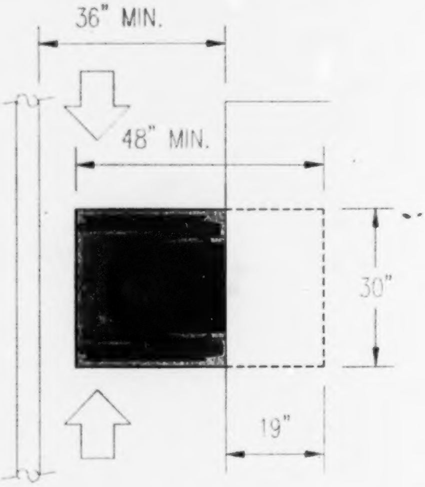
Fixed or Built-in Seating and Tables [4.32]

Scoping [4.1.3(18)]

Access is required to at least 5% of fixed or built-in seating and tables.

Seating [4.32.2] and Knee Clearance [4.32.3]

Knee space at least 27 inches high is required for a depth of 19 inches. The over-the-surface reach is limited to 25 inches if at least this much space is available below for knees and toes; (the forward seated reach may not extend beyond the toes). Maneuvering space is important where turning is required into the space.



Height of Tables or Counters [4.32.4]

Counter and table surface heights (28 to 34 inches) should be specified in consideration of the intended use. A height at the lower end of this range is generally preferable for surfaces used for extended periods of time (study carrels, dining counters, kitchen counters in dwelling units) as opposed to those used briefly or intermittently (breakroom counters, hotel room kitchenette counters). While 34 inches is the specified maximum for an accessible counter, the entire counter is not required to be accessible. A height of 36 inches, where necessary to accommodate below counter appliances, may be acceptable in limited use areas such as employee breakrooms, as long as a portion of the counter is accessible. (This is consistent with counters in business and mercantile facilities since customer use is limited to simple activities like writing checks or signing receipts.)

Assembly Areas [4.33]

ADAAG requirements for assembly areas apply to areas where groups of people gather for recreational, educational, political, social, or amusement purposes or for the consumption of food and drink. Areas used for other purposes are not covered by 4.33, including those that may be considered assembly occupancies under building codes. For example, restaurants and cafeterias are additionally covered by section 5 although certain requirements in 4.33 may apply to dining facilities equipped with performing areas, fixed theater-style seating, or audio-amplification systems for entertainment purposes.

Scoping [4.1.3(19)]

Requirements for accessible seating and permanent assistive listening systems apply where seating is fixed or built-in. This includes seating that is permanently or temporarily fastened to the structure, or that is retractable, such as some bleachers. Requirements for portable assistive listening systems (outlets and wiring) may apply to areas without fixed seating.

Accessible Seating

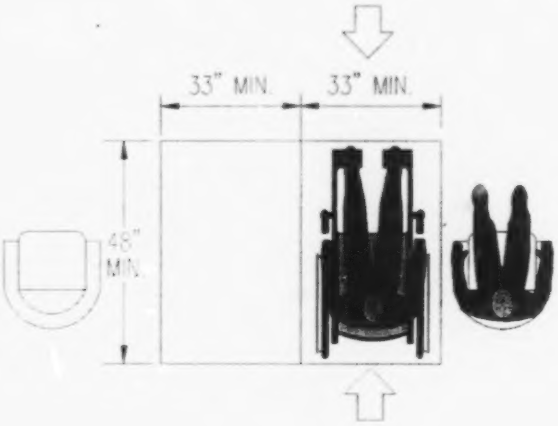
The minimum number of wheelchair spaces applies to individual spaces (33 inches wide minimum). Those that are paired (as shown in ADAAG Figure 46) count as two spaces. At least one fixed seat for a companion must be located next to each wheelchair space. Aisle seats with folding or removable armrests (or no armrests) are required for people who walk with difficulty or who prefer to transfer from wheelchairs.

Seating Capacity	Wheelchair Spaces	Accessible Aisle Seats	Dispersion
4 - 25	1	1	wheelchair spaces do not have to be dispersed Δ
26 - 50	2	1	
51 - 100	4	1	
101 - 200	4	2	
201 - 300	4	3	
301 - 400	6	4	∇ spaces must be dispersed (where sight lines exceed 5% spaces may be clustered)
401 - 500	6	5	
501 - 600	7*	6	
601 - 700	8*	7	
701 - 800	9*	8	
800 - 900	10*	9	
901 - 1000	11*	10	

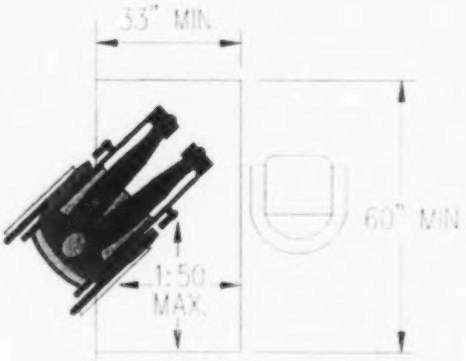
•over 500, 6 plus 1 for every seating capacity increase of 100.

Wheelchair Spaces

Maneuvering into wheelchair spaces is often easier from the front or back than from the side, especially where they are paired. Paired spaces allow flexibility for people attending a performance together. Wheelchair spaces should not overlap required exit widths or circulation paths and should provide for shoulder-to-shoulder alignment with occupants of adjacent seats (an important consideration in calculating sight lines). The 33-inch minimum width for spaces provides extra width for maneuvering within a confined area.

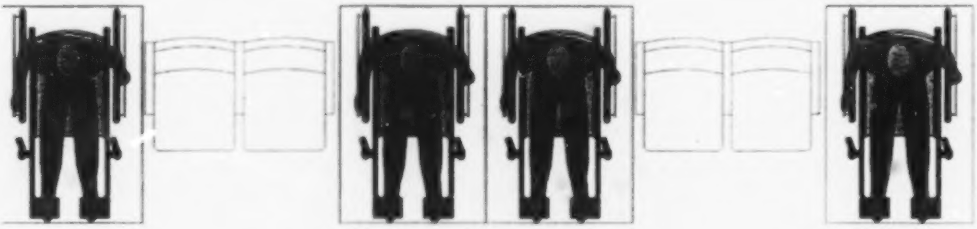


Wheelchair spaces must be level (2% maximum slope in any direction) and adjoining routes and maneuvering spaces must provide flush connections so that maneuvering to and from spaces does not occur on a slope. Spaces with side approaches are required to be longer (60 inches minimum) to provide maneuvering for turns into the space.

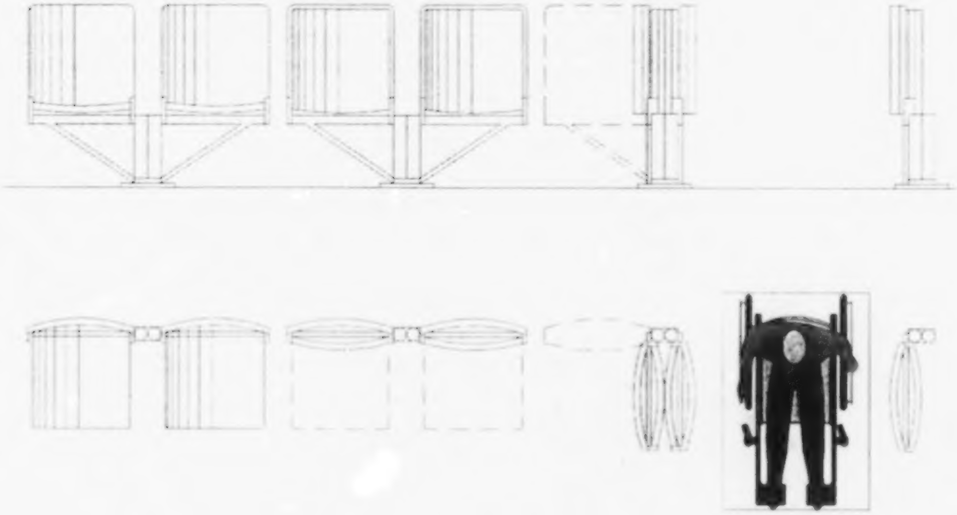


Companion Seating

At least one fixed seat is required next to each wheelchair space. Pairing wheelchair spaces allows two people who use wheelchairs to sit together.



Removable seats or other fixed seats that swing or fold away from the space can be used in wheelchair spaces. Folding seats are more convenient and require less planning than seats that must be removed in advance by facility management. Some paired folding seats fold into a fixed center bar to allow one or two wheelchair spaces. However, the minimum number of wheelchair spaces plus their companion seats still must be provided.



Dispersion

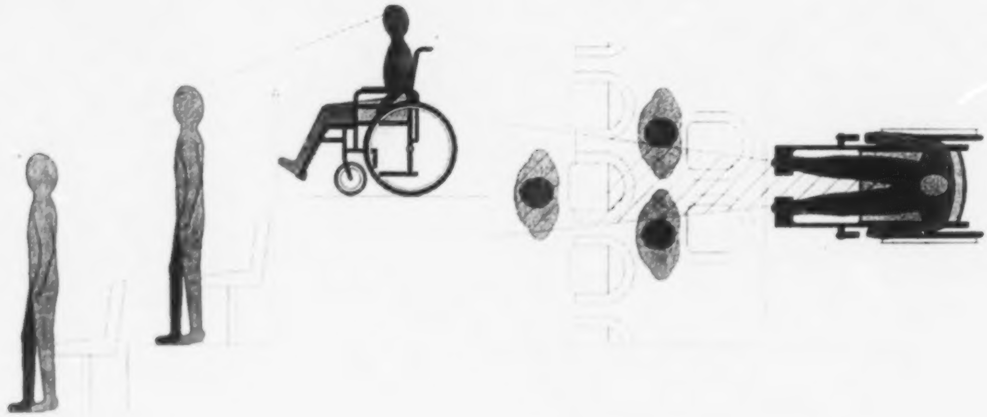
People with disabilities must have comparable sight lines (and choices of admission prices) as do other members of the general public. Dispersion is required where fixed assembly seating exceeds 300. Wheelchair spaces must be provided in all areas, including sky boxes and specialty areas. Even in small facilities where few spaces are required, offering choice in seating and viewing distance should be a design objective. This includes choice in both vertical and horizontal sections of a seating bowl and may vary by event. Accessible seating should be located to maximize flexibility in multi-purpose facilities. Clustering wheelchair spaces is allowed only where sight line slopes exceed 5%, such as bleachers and balconies (or in alterations where dispersion is technically infeasible). This exception is intended to apply only to those discrete parts of an assembly seating area where aisles are sloped or stepped and where the pitch of the line of sight is greater than 5%. Often such seating is situated high above the performing area. This is not an exemption from requirements for integrated or companion seating or choice in admission prices. Where dispersion is feasible, it must be achieved.

Integration

Integrated settings are an important principle of access. Even where wheelchair spaces are not required to be dispersed, it is important that they be provided within the footprint of the seating layout. (Bleachers with notches or cut-out areas will provide both integration and companion seating.) Where wheelchair seating areas are located next to busy circulation areas, barriers may be advisable to prevent crowd overflow. It is important that such separations not obstruct or complicate maneuvering to and from seating areas.

Sight Lines

Both the horizontal and vertical viewing angles must be considered in the design of assembly areas. A variety of factors determine the quality of "vertical" sight lines, such as the distance from performance areas, row spacing, staggering of seats, and floor slope. Sight lines are calculated according to certain industry conventions and practices. Some conventions, such as the average eye level height of a seated adult is within the accepted range for people seated in wheelchairs. Industry conventions for determining lines of sight may be adequate for facilities where the audience is not likely to stand during events or performances. However, sports arenas and other facilities where spectators may stand during events add a critical dimension to achieving lines of sight from wheelchair spaces. When only conventional seated sight lines have been used to determine the seating bowl shape, standing spectators usually obstruct the line of sight for several rows in front of a person using a wheelchair who cannot stand with the rest of the audience. In such facilities, wheelchair spaces must provide lines of sight over standing spectators. This can be accomplished by increasing the elevation of wheelchair seating or, in some cases, locating wheelchair seating at cross aisles.



Emergency Egress

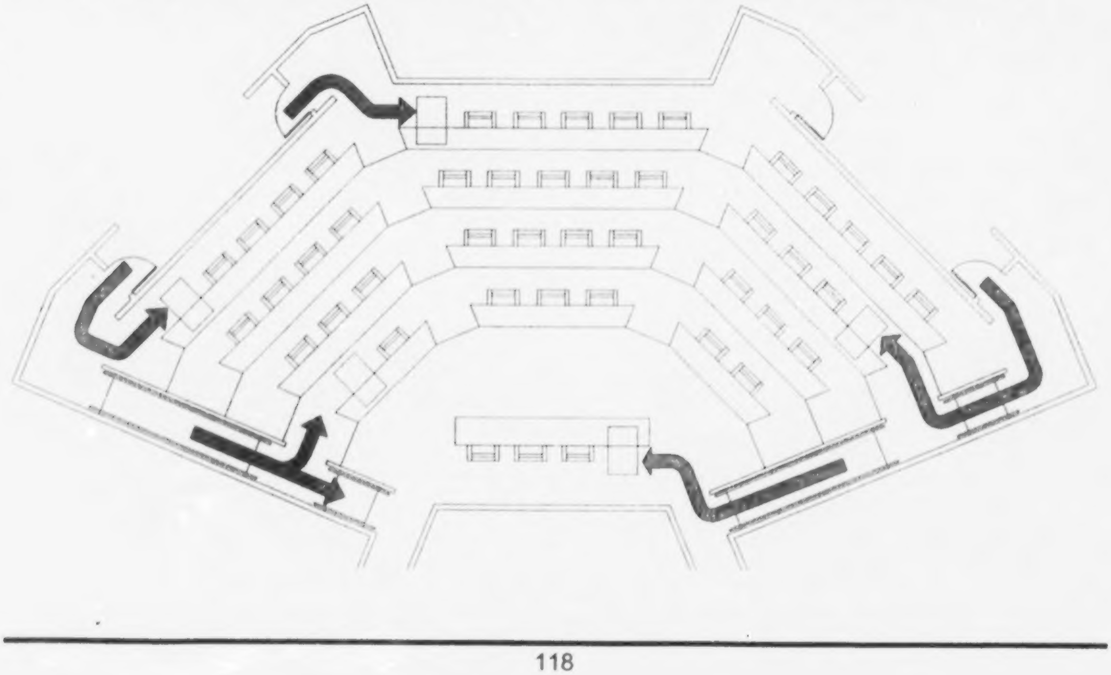
ADAAG requires that accessible seating be located on an accessible route which also serves as a means of egress. *Recommendations:* Considerations beyond this basic requirement may be advisable in large assembly areas since they usually have several required exits. According to research sponsored by the Access Board ("Access to Assembly Areas" by the Center for Accessible Design, 1992), it may be prudent to provide more than once accessible means of egress route from accessible seating. Consider:

- more than one accessible means of egress from accessible seating to accessible exits or areas of rescue assistance
- locating wheelchair spaces to minimize the distance to accessible exits or areas of rescue assistance
- accessible egress routes that coincide with other exit routes to avoid forcing a person using a wheelchair to travel against the general flow
- increased aisle widths along accessible egress routes to allow passing and easier maneuvering

Building or life safety codes specify the minimum distances between rows of fixed seating in consideration of the number of seats per row, exit aisle widths, and the arrangement and location of exit doors. *Recommendations*: "Continental" seating can facilitate access to and from mid-row seats for all people, including those who walk with difficulty since row spacing and exit door requirements are increased in order to achieve a greater number of seats per row. Wider row spacing and aisle widths can accommodate wheelchair seating so that unobstructed required exit widths are maintained.

Access to Performing Areas [4.33.5]

An accessible route must connect wheelchair spaces with performing areas, including stages, arena floors, playing fields, dressing and locker rooms, dugouts, and other areas used by performers or players. *Recommendations:* Accessible routes should coincide with the general route; alternate back-of-the-house routes, while not specifically prohibited by ADAAG, may nonetheless be considered discriminatory. Aisles with slopes no steeper than 1:12 are often feasible in small and medium size assembly areas and permit accessible routes that coincide with general routes. While handrails are not required on ramps adjacent to assembly seating, locating aisles (including those that are stepped) along walls will permit handrails on one side for the benefit of people who walk with difficulty.



Assistive Listening Systems (ALS)

Assistive listening systems pick up sound at or close to its source and deliver it to the listener's ear. This more direct transmission improves sound quality by reducing the effects of background noise and reverberation and, as needed, increasing the volume. These devices serve people who are hard of hearing, including those who use hearing aids. Personal systems are available for use in a variety of situations, including individual conversations. ADAAG covers those systems used with public address systems in certain assembly occupancies.

How ALSs Operate

Like public address systems, ALSs convert live or recorded sound into an electromagnetic signal. A sound source (usually a microphone) sends the signal to a transmitter which relays it to receivers provided to listeners. Couplers, such as ear phones, decode the signal from the receiver and convert it back into sound for the user. *Recommendation:* While a "complete" system with the necessary components can be bought off-the-shelf, ALSs designed as "mix and match" systems can provide a range of components appropriate for individual users, events, and environments.

Types of Systems

Assistive listening systems are generally categorized by their mode of transmission. There are hard-wired systems and three types of wireless systems: induction loop, infrared, and FM radio transmission. Each has different advantages and disadvantages that can help determine which system is best for a given application. For example, an FM system may be better than an infrared system in some open-air assemblies since infrared signals can be overpowered by the sun; on the other hand an infrared system is typically a better choice than an FM system where confidential transmission is important. *Recommendations:* In selecting an ALS, consultation with professionals such as sound system consultants or contractors is often a good idea. No matter which technology is used, consider too that the quality of the system often determines the quality of the sound and transmission.

Minimum Requirement

ADAAG requires permanently installed ALSs in those assembly areas where audible communication is integral to the use of a space (movie theaters, concert and lecture halls, playhouses, meeting rooms, etc.); where fixed seating is provided and where there may be an audio-amplification system. For other assembly areas, such as those without fixed seating, ADAAG requires either a permanently installed system or electrical outlets and supplementary wiring for a portable system; this requirement, however, does not necessarily require the addition of electrical outlets.

Assembly Areas

(where audible communication is integral to use of the space)

Room Occupancy	Audio-Amplification System Provided?	Fixed Seating Provided?	Required:
under 50	no	yes or no	outlets & wiring
	yes	no	outlets & wiring
	yes	yes	permanent system
50 or more	yes or no	yes	permanent system
	yes or no	no	outlets & wiring

Public Address Systems and Microphones

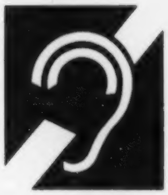
ALSs can be integrated with public address systems or operated separately. *Recommendations:* Both systems can share sound sources (microphones, mixers, tape players, VCRs) but not all microphones of a public address system work well with ALSs. Also, it is highly recommended that the ALS signal processor and amplifier be separate from the public address system unit in order to maintain independent equalization and volume control and to prevent distortion and feedback. No matter what system is used, selection of microphones is critical. For achieving the best sound quality, microphones (including wireless and lavaliere) should:

- limit background noise (noise-suppressing directional types, such as those with cardioid or hyper-cardioid patterns are best)
- provide the highest gain signal (consider battery-powered or "phantom" powered condenser microphones)
- accommodate speech over all frequencies (use wide frequency response microphones and avoid foam wind screens since they can filter out high frequencies)
- be used with an automatic mixer (which activates microphones as they are spoken into) where multiple microphones are used

For best results, participants should be sure to use microphones and speak one at a time, talk close to microphones "across" the top (which improves transmission of consonant sounds), and use their regular volume level, allowing the system to do the work.

Receivers and Couplers

ADAAG requires that receivers be provided to serve at least 4% of the total number of seats (but in no case fewer than two). Couplers connect the ALS receiver to the listener's ear. *Recommendations:* While a system may come with only one type of receiver, a variety helps meet the needs and preferences of different users. People often choose to wear their hearing aids while using assistive listening systems. It is important that couplers or receivers be compatible with hearing aids. Neckloops and headsets that can be worn as neckloops will be compatible. Receivers that are not compatible include earbuds, which may require removal of hearing aids, silhouette transducers, earphones, and headsets that must be worn over the ear, which can create disruptive interference in the transmission.



Signage

Where assistive listening systems are required, signs must be provided to notify patrons of ALS availability. This sign must include the international symbol of access to assistive listening systems (specified in 4.30.7). Signs are subject to requirements in 4.30 for character proportion (4.30.2) and height (4.30.3) and sign finish and contrast (4.30.5). *Recommendations:* Signs should include appropriate messages based on the type of system provided, such as "Infrared Assistive Listening System Available -- Please Ask," "Audio Loop in Use/ Turn T-Switch for Better Hearing or Ask for Help," or "FM Assistive Listening System Available -- Please Ask." It's helpful to indicate on the sign where devices are available.

Maintenance

By far, the most frequent complaint about assistive listening systems is that they do not work properly and that no one at a facility knows how to operate or fix them. While this is not addressed by ADAAG, the Department of Justice's title III rule requires that accessible features and equipment be maintained in operable condition.

Audio Induction Loop

This system uses a wire loop to receive input from a public address system or microphone and transmits sound by creating a magnetic field within the loop. Listeners must be sitting within the loop and have either a receiver or a hearing aid with a telecoil. Receivers can be connected to a variety of coupler types and are compatible with all loop systems. Loop systems are readily integrated with conventional sound systems and relatively easy to maintain. The loop may surround all or part of a room and can be permanently installed in the ceiling, floor or walls of a room. Portable systems are also available.

Since the signal created is, in a sense, electromagnetic interference, multiple loop systems can easily interfere with each other and are susceptible to interference from electrical wiring, computer monitors, transformers, and unshielded fluorescent lighting. In addition, the loop can also cause hum in electrical devices not shielded from electromagnetic fields, like a nearby cassette tape player. Also, construction steel in a building may cause erratic coverage (steel can absorb the magnetic fields, causing fluctuating reception). There is a new technology known as a 3-D mat that can be used instead of the conventional induction loop. There is very little spillover with 3-D mats and they are less susceptible to electromagnetic interference.

Consistent and uniform coverage is sometimes difficult with wire loops (although not with 3-D mats), depending on the application and the relative position of the listener. A listener's seating position and shifting can influence reception, making it better or worse. Moving the receiver position just a few inches can sometimes correct the reception.

Infrared Systems

These systems use invisible (infrared) light beams to carry information from a transmitter connected to a public address system or microphone to special portable receivers worn by the listener. The receiver is connected by wire to any of a variety of couplers or directly to a hearing aid equipped with direct audio input. A receiver and a coupler must be supplied to each listener, including those using hearing aids.

Infrared light, like visible light, does not penetrate most construction materials but can reflect off many materials and is broad beamed. An uninterrupted line of sight is required between the transmitter and the receiver. The configuration of rooms and architectural elements such as columns or decorative pillars are important factors in selecting and designing an infrared system. The overall strength of the incident light on the receiver will determine whether or not a usable signal can be received. Emitters must be installed high up on the walls and more emitters may be added and located as necessary to insure proper signal strength. Since the signal is overpowered by the sun, infrared systems may not be suitable in some outdoor areas that are unshaded, uncovered, or exposed to much sunlight. Incandescent and fluorescent lighting can also produce interference. One reported problem, not well documented, is possible interference from other devices using signals, such as audiovisual controllers for slide or VCR presentations.

An infrared system is the only wireless system that provides confidential transmission since the signal cannot go through non-transparent materials. There is no spillover to nearby systems and all transmitters and receivers in a facility can be tuned alike, an important consideration where multiple systems are provided in a facility. A person can walk from room to room, as in a conference, and not need a new receiver, or need to adjust a receiver for each room. Multiple channel systems are available and can be used to support descriptive video for people who are blind or simultaneous translation in multiple languages. Two channels are typically available by modulating the wavelength. (ALSs broadcast an infrared signal at a wavelength of 950 nm.) Infrared systems are reported to have somewhat better frequency response than FM systems.

FM Systems

FM systems use a short-range radio transmitter which converts sound to a radio signal sent to small FM radios tuned to the same channel usually worn around the neck. The radio receiver can be connected to a choice of couplers. FM systems are highly portable and flexible, subject to requirements for frequency control, and provide an alternative for facilities with multiple venues which can provide the requisite support. An FM system is simple to install and easily integrated with existing sound systems. There are few constraints on transmitter location since FM broadcasts are not constrained to the line of sight like infrared systems. Signal range is usually determined by the size of the antenna and the power of the transmitter but in most cases only one transmitter is needed (typical ALS range is roughly 300 feet). This, plus the fact that sunlight does not interfere with the signal, make it the best choice for large outdoor assemblies such as open-air arenas.

Each listener using the system must have an FM receiver but can move around more freely than with other wireless systems (loop, infrared). A choice must be made between providing fixed channel receivers (usable only with a compatible transmitter) and tunable receivers (more flexible, but also more expensive). Some people with hearing impairments have difficulty tuning a receiver, especially when multiple programs are being conducted.

The fact that FM signals can spillover into adjacent rooms or buildings can present problems. If confidentiality is required then an FM system is likely not the best choice. Use of an FM broadcast might also raise copyright issues for certain performances since anyone with a properly tuned FM receiver can intercept the broadcast. Some FM systems may experience signal drift (depending on the quality of the system), radio wave interference (depending on the environment), and interference from other FM devices using adjacent channels, such as pagers. Frequency management is an important consideration. However, most institutions that support multiple broadcasts are likely to have an audiovisual support staff which can assume responsibilities for this important task. The use of tunable receivers simplifies the problem of frequency control, but puts the responsibility on the listener. Implementation plans should include instructions and tuning assistance for users available where receivers and couplers are issued.

Multiple frequencies are possible and can support various programs such as audio description for people who are blind and simultaneous translation in multiple languages. However, a separate transmitter is needed when simultaneous programs are conducted within a facility, or even in nearby facilities.

Three formats are available within the frequency range (72 - 76 mHz) for ALS applications:

- 40 channels for the educational band (used in educational settings, this allows many simultaneous classes or events)
- 10 channels for wide band transmissions (popular in single channel applications)
- 17 channels for narrow band transmissions (useful where multiple FM systems are used in close proximity, such as a theater complex)

Hardwired Systems

Hardwired systems incorporate a direct wire link between the sound source and the coupler. Although the quality of the transmitted sound may be good, the fact that individual seats must be connected is so limiting that hard-wired systems are rarely used any more.

	INDUCTION LOOP	INFRARED	FM
Sources of Signal Interference	wiring, computers, transformers, fluorescent lighting (less with 3-D mat); construction steel can cause erratic coverage	sunlight, incandescent and fluorescent light, other IR devices	other FM transmitters
Spillover	yes (wire loop) or very little (3-D mat)	none through non-transparent materials	yes
Confidentiality of Transmission	low	high	low
Sound Quality	can be uneven (better with 3-D mats)	good	good but signal drift possible
User Convenience	listeners restricted to loop (or mat); may need to adjust seating position to improve reception (less with mat)	line of sight required between emitter and receivers	listeners have flexibility to move around; tunable receivers require adjustment by listener
Receivers	people with telecoil hearing aids need no receivers; receivers are compatible with all loop systems	can be tuned to the same channel or frequency for an entire building; compatible with most infrared emitters; broadest frequency response of wireless systems	each event must use a frequency pre-tuned or adjusted by the user
Maintenance	low	low	high
Integration with Public Address System	possible	easy	easy
Installation	can be complex in large areas (installation of wire loop)	can be complex in large areas (installation of emitters)	simple

Automated Teller Machines [4.34]

Scoping [4.1.3(20)]

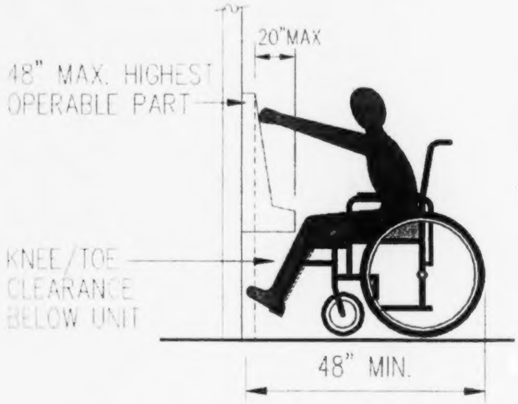
Where automated teller machines (ATMs) are provided, ADAAG requires access to at least one ATM in each location. The requirements of this section also apply to automatic fare vending and payment systems in transit stations. Specifications in 4.34.2 and 4.34.3 were modified in June 1993 to allow either a forward or side approach and to provide further guidance on side reach heights.

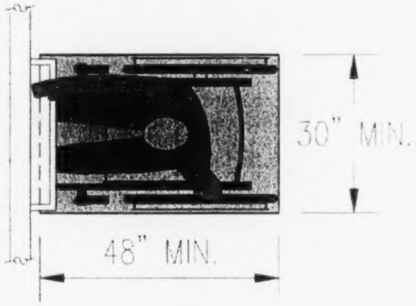
Clear Floor Space [4.34.2] and Reach Ranges [4.34.3]

Either a forward approach or a parallel approach to the ATM must be provided. Maximum reach heights to controls are based on the approach provided. The reach height applies to all controls and elements available for customer activation. (If different controls can perform the same function in a substantially equivalent manner, then only one is required to be within the required reach).

Forward Approach

A maximum height of 48 inches is required for a forward reach. Clear floor space must be provided to the face of the unit since the seated forward reach does not extend much beyond the toes. Toe/knee clearance below the unit makes this reach easier by allowing a closer approach.

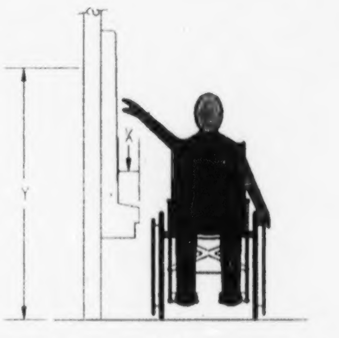




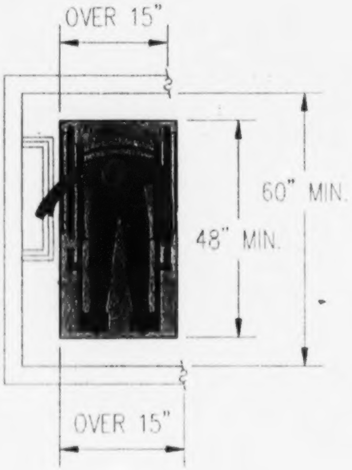
Side Approach

Where space is provided for a side approach, controls can be mounted at the heights allowed for side reaches. In June 1993, additional specifications were provided for the maximum height based on the reach depth. Where the approach space is obstructed on both sides more than 15 inches, additional space for maneuvering is required. *Recommendation:* The clear floor space should be centered on the ATM unit.

Reach Depth (x)	Maximum Height (y)
10"	54"
11"	53 1/2"
12"	53"
13"	52 1/2"
14"	51 1/2"
15"	51"
16"	50 1/2"
17"	50"
18"	49 1/2"
19"	49"
20"	48 1/2"
21"	47 1/2"
22"	47"
23"	46 1/2"
24"	46"



REACH DEPTH (X) IS MEASURED FROM THE CLEAR FLOOR SPACE.



Controls [4.34.4]

Controls for user activation must:

- be automatic or operable with one hand
- operate without tight grasping, pinching, or twisting of the wrist
- require no more than 5 lb force to activate

Equipment for Persons with Vision Impairments [4.34.5]

Access for people with vision impairments was specified as a performance standard so that manufacturers could examine and develop solutions, including those that take advantage of new technologies. Braille instructions and control labels are commonly provided (Braille output is not required). Audible devices and handsets can also provide access while maintaining privacy. Even touch-screens with appropriate software and hardware can be made accessible to persons who are blind.

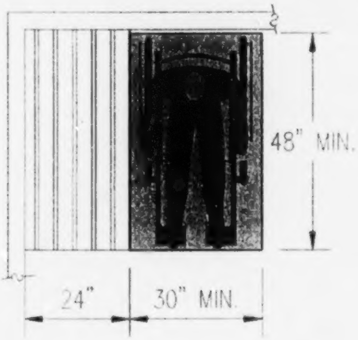
Dressing and Fitting Rooms [4.35]

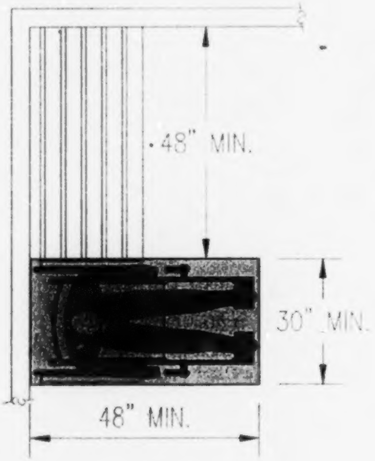
Scoping [4.1.3(21), 4.1.6(3)(h)]

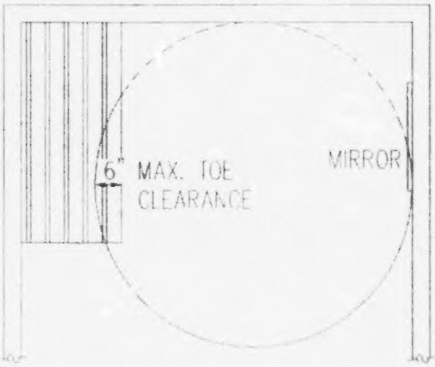
ADAAG requires access to 5% of each "type" of dressing room in each location. "Type" includes those serving different genders or discrete functions, such as treatment or exam facilities. In alterations, where this is not technically feasible, at least one accessible dressing room per floor is allowed for each sex (or one unisex room if that is the only type provided).

Clear Floor Space [4.35.2]

Clear floor space is required for a parallel approach to the bench. *Recommendations:* Consider additional space on the narrow dimension to allow alternative transfers. Some people may need to fully recline to dress or change clothes. Benches long enough to allow a supine position can be helpful where people may to need to completely undress or change clothing (locker and shower rooms, certain medical treatment or exam rooms, etc.). Placing the bench in a corner will allow the walls to be used as support or as a backrest.



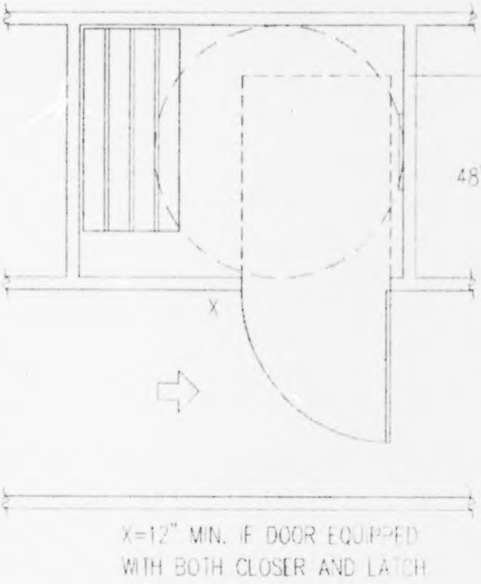


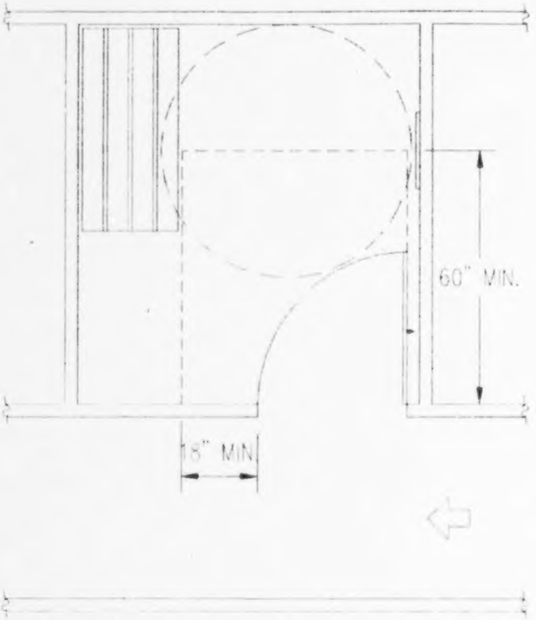


Space is important so that users can turn around and exit through swinging or sliding doors. Benches can overlap turning space where clearance (9 inches minimum) is available for toes. Where mirrors are located in dressing rooms, those in accessible rooms must be full length (18 by 54 inches minimum) and mounted to provide a view from the bench as well as from a standing position.

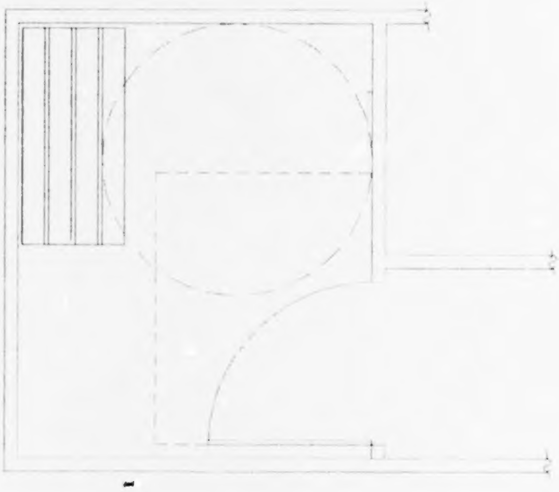
Doors [4.35.3]

The size of rooms is further determined by the location and swing of doors. Doors cannot swing into the turning space (as allowed in toilet and bathrooms because they are larger). *Recommendation:* For side approaches, maneuvering is easier for a latch-side approach where doors swing out and a hinge-side is often easier where doors swing in.

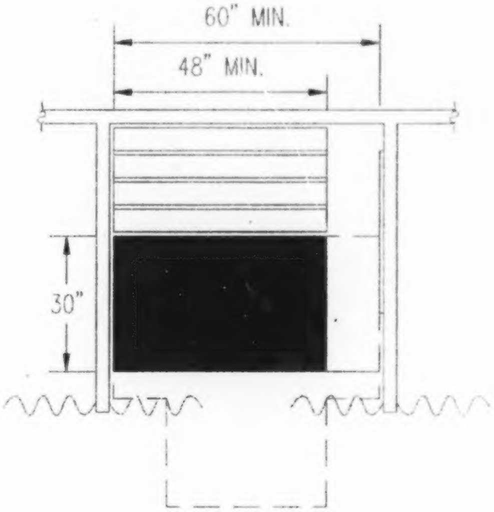

48" MIN.
X
X=12" MIN. IF DOOR EQUIPPED WITH BOTH CLOSER AND LATCH


60" MIN.
18" MIN.

Recommendation: Additional space can be incorporated into an accessible dressing room if it is located at the end of a row.

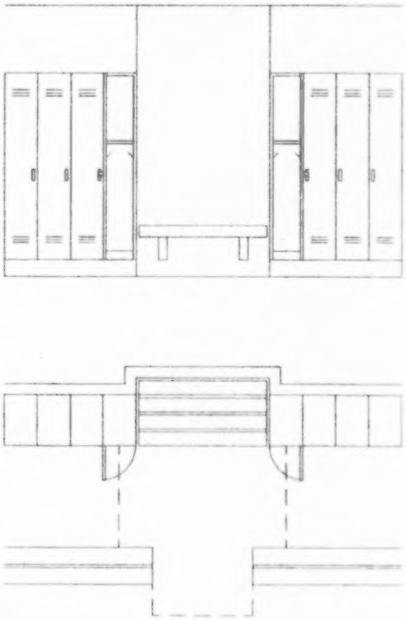


In rooms with curtained openings, clear floor space requirements for alcoves in 4.2.4 must be provided. For example, if a side approach is provided, the space must be at least 60 inches long (instead of 48 inches) where the space is obstructed on both sides more than 15 inches. While turning space is not required wholly within rooms with curtained openings, it should be available so that users can easily enter and exit the space.



Locker Rooms

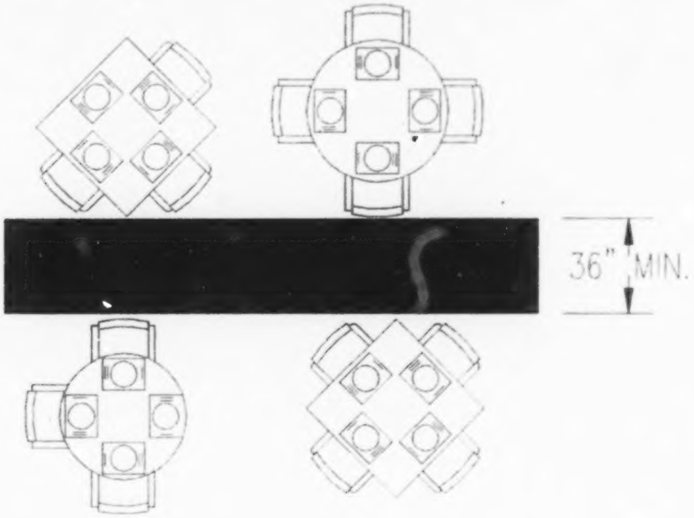
Recommendations: Benches of the required size (24 inches deep and at least 48 inches long) can be integrated with lockers so that back support is provided from a wall. Turning space at the bench, although not required, will allow easier wheelchair maneuvering to and from the bench.



Restaurants and Cafeterias [5]

General [5.1]/ Access Aisles [5.3]

Access is required to 5% of fixed or built-in tables distributed throughout dining areas. The required clear width (36 inches minimum) is specified for the clearance between the edges of fixed tables or between table edges and walls. *Recommendation:* Consider providing additional clearance so that routes remain accessible at occupied tables. Space should also be available so that people using wheelchairs do not obstruct required exit and circulation routes. This also allows additional space for wheelchair maneuvering to and from tables.



Counters and Bars [5.2]

A "portion" of counters where food or drink is consumed must be accessible or service must be available at accessible tables in the same area. Counters where food or drink is sold or distributed but not consumed can be treated as sales and service counters, which are addressed in 7.2.

Types of Counters	Maximum Height	Minimum Length	Knee Clearance (forward approach)
Dining/ Bars (service)	34 in	60 in	required
Dining/ Bars (no service)	34 in	not specified (consider 60 in)	required
Food Service (tray slides)	34 in	full length	optional
Sales/Service	36 in	36 in	optional

Dining Areas [5.4]/ Raised Platforms [5.7]

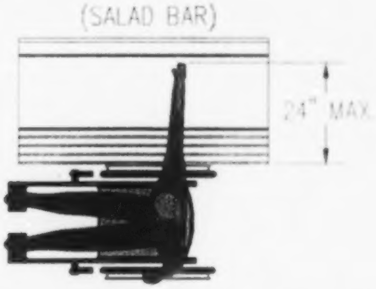
Since accessible seating must be dispersed throughout new facilities, it is important that an accessible route be provided to all raised or sunken dining areas, outdoor seating areas, loggias, etc. (An exception is allowed for mezzanines that accommodate no more than a third of the seating area in buildings without elevators). Platform lifts can be used at raised platforms that serve a head table or speaker's lectern but not other dining areas except where existing constraints make ramp (or elevator) access infeasible.

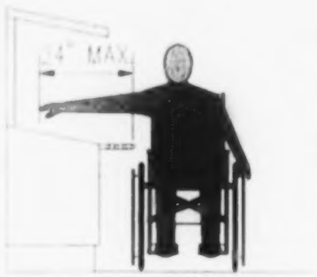
Food Service Lines [5.5] and Tableware and Condiment Areas [5.6]

Tray slides, if provided, must be no more than 34 inches high. Self-service shelves and dispensers must be within allowable reach ranges. Additional shelves or those where service is available can be located beyond these ranges. Pass-through space at service counters can provide easier access.

Salad Bars and Buffet Counters

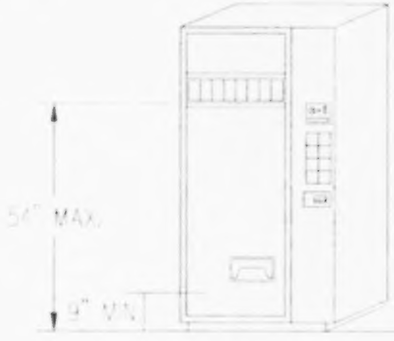
Recommendations: The standard reach range should be considered in the design of built-in salad bars although not all portions are required to be within this range (food layout and suitable utensils are also factors). Since it can be difficult to maneuver a wheelchair while balancing plates of food, tray or plate slides can greatly facilitate access but their effect on reach should be taken into account.



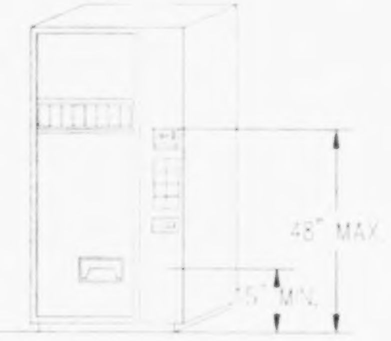


Vending Machines and Other Equipment [5.8]

Since vending machines often are not fixed, ADAAG only requires that clear space be available at them for a forward or side approach and that they be on an accessible route. *Recommendation:* It is recommended that the operable portions be within accessible reach ranges.



SIDE APPROACH POSSIBLE



FORWARD APPROACH

Medical Care Facilities [6]

Section 6 covers access to patient bedrooms and applies to "medical care facilities" which are defined in part as those providing overnight stay. Those that do not, such as doctors' offices and outpatient facilities, are subject to other requirements of ADAAG. The facilities listed in section 6.1 are provided as examples of the three scoping categories. Other facilities not listed should be treated according to the examples they most closely resemble. The types of services provided and the characteristics of the intended population are often key in determining which scoping category to follow.

General

Because many patients in a medical care facility may experience reduced mobility during their stay, at least 10% of patient bedrooms and in-room bathrooms must be fully accessible. This category covers those facilities where the need for access is not likely to exceed the norm among medical occupancies. Examples include general purpose and pediatric hospitals, obstetric units, substance abuse treatment centers, and most mental health care facilities. All public use and common use areas are required to be fully accessible.

Hospitals and Rehabilitation Facilities Specializing in the Treatment of Conditions Affecting Mobility

Access is required to all patient bedrooms and toilet rooms in facilities or units within that specialize in treating conditions that affect mobility. This includes not only people who use wheeled mobility aids, but also those who may walk with difficulty or use walkers, canes, crutches, braces, or prostheses. Consideration must be given to the various conditions that affect mobility such as:

- arthritic, neurological, or orthopedic conditions
- respiratory diseases that require use of portable oxygen
- cardiac conditions that impose significant functional limitations

It may be necessary to weigh the degree to which a facility specializes in treatment of such conditions over others, but careful consideration of the need among the intended population is key. Examples include orthopedic hospitals, physical rehabilitation facilities, and spinal cord or traumatic brain injury treatment centers. Scoping can be applied on a pro rata basis to portions of a facility where only certain units or departments provide such treatment.

Long Term Care / Nursing Homes

Definitions of "long term care" in health regulations, building codes, and accreditation standards can be used as a guide to determine in which facilities 50% of the patient room are required to be accessible. (ADAAG does not define the term). The degree of medical treatment or care provided at a facility may need to be taken into account since this section is not intended to cover facilities that provide residential but little or no medical care. Many facilities offer a combination of services, in which case accessibility requirements may be applied to different parts of the complex. New multi-unit residential facilities are covered by the Fair Housing Amendments Act; information regarding requirements is available from the Department of Housing and Urban Development (HUD).

Dispersion

Accessible bedrooms should be dispersed among all units or departments providing overnight stay and among different classes of rooms (private, semi-private, etc.). Industry practice and needs assessment can be used to further determine the distribution. For example, a greater number might be located in general surgical units than in pediatric and obstetric wards. Different units may be subject to different scoping requirements, such as an orthopedic wing (where 100% of patient rooms are required to be accessible) within a general hospital (where only 10% of patient bedrooms must be accessible).

Alterations / Additions

The minimum number of accessible patient rooms required is based on the total number of bedrooms that are altered or added, including where a unit or department is completely renovated. In partial renovations of a unit or department, altered bedrooms must be made accessible according to the number required in new construction unless that number is already met (either within that unit or in other parts of the facility).

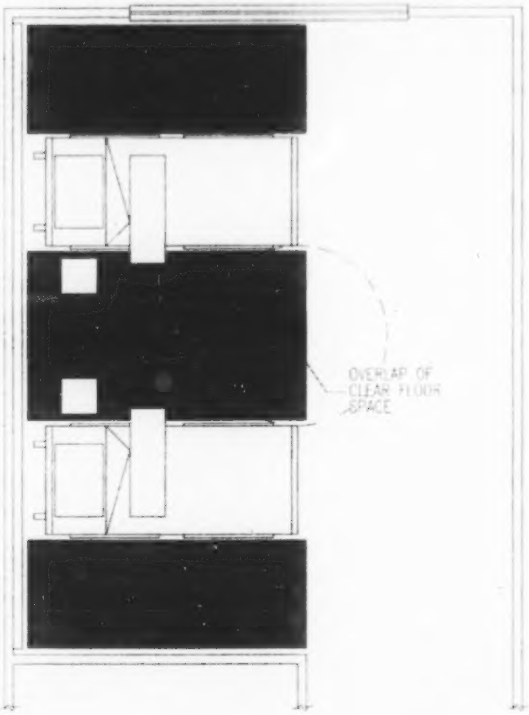
Patient Bedrooms [6.3]

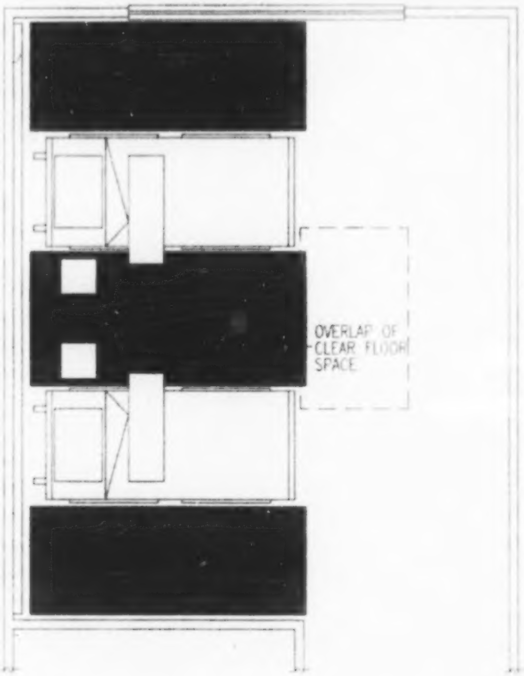
Doors

The exception from latch-side maneuvering clearances is allowed only at acute care bedrooms, not throughout a hospital. *Recommendation:* Compliance with 4.13.6 is recommended because while wider door openings may facilitate access, they do not fully compensate for latch-side clearance, particularly on the pull side.

Bedside Clearances

Clearance at least 36 inches wide is required on each side of beds. Where more than one bed is provided, this space can overlap. Privacy curtains or screens that can be easily moved out of the way can also overlap this clearance. T-shaped space can be provided within bedside clearances. Turning space (60 inch diameter circle) is recommended between beds to allow additional maneuvering and transfer space.





Controls and Equipment

Access requirements apply to fixed controls and operating mechanisms intended for independent use by patients. Equipment and controls used by staff are not required to comply although access (or adaptability) may be advisable in some cases so that employees with disabilities can be more easily accommodated.

Patient Toilet Rooms [6.4]

ADAAG specifications are based on the independent use of toilet and bathing facilities and do not address alternate designs for assisted use. Requirements for both independent and assisted access can usually be met in facilities where ADAAG applies to a portion (10% or 50%) of patient bedrooms. Where all patient bedrooms (and toilet rooms) must comply, alternatives to certain ADAAG specifications may be possible as an equivalent facilitation, as permitted in 2.2. Any considered departures should be based on a careful assessment of:

- the needs of the intended population
- the degree to which an ADAAG specification and a preferred design conflict
- the feasibility of designs that can accommodate both independent and assisted access

Business and Mercantile [7]

Sales and Service Counters, Teller Windows, Information Counters [7.2]

ADAAG generally specifies accessible counter heights up to 34 inches [4.32] but allows a height up to 36 inches for counters and service windows in business and mercantile occupancies because public use is limited to brief activities, such as writing a check, signing a receipt, or passing merchandise over the counter.

Sales Counters [7.2(1)]

In providing access to each "type" it is necessary to consider counters where only certain transactions can be made such as refunds for example, or counters that exclusively serve specific departments or areas of a sales floor exclusively. *Recommendation:* Travel distances between counters and facility size should be considered where not all counters are accessible. (ADAAG does not specify maximum travel distances).

Other Counters/ Teller Windows [7.2(2)]

Alternatives to 36-inch high counters (lowered portions, folding shelves) are recognized since other design considerations (security, use by standees) may make a higher surface preferable. These alternatives provide an accessible writing surface at counters and windows used for banking, registration, payment, and other purposes. Where multiple teller windows or service areas are provided, such as in bank lobbies, consider access to each one. This eliminates operational considerations for convenient access where single queues form or where only a portion of windows or stations are staffed. At counters designed mainly for handing materials back and forth where the need for a writing surface by customers is unlikely (concierge desks, deli counters, etc.), pass-through space alongside counters can suffice. Fixed elements for public use, such as service buzzers and ticket number dispensers, need to be within accessible reach ranges and on an accessible route.

Check-Out Aisles [7.3]

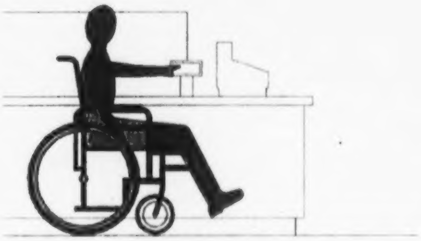
Access is required based on facility size and the number of check-outs of each design. For facilities with less than 5,000 square feet of selling space, at least one check-out aisle must be accessible.

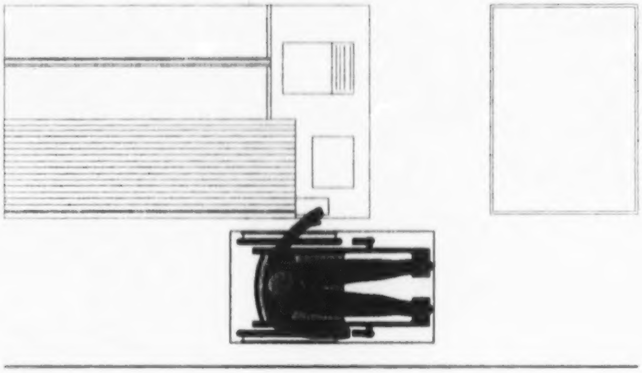
Facilities with at least 5,000 sq. ft. of selling space

Total of Each Design*	Minimum Accessible of Each Design
1 - 4	1
5 - 8	2
9 - 15	3
over 15	3 (+ 20% of total above 15)

* e.g., belt length or no belt, express or cash only, etc.

Clear passage must be at least 36 inches wide continuously and 32 inches at a point (24 inch maximum distance). Access can be provided at aisles shared between two check-outs. Access is also necessary at aisles used for exit only (but not check-out). Transaction machines and writing shelves located at accessible aisles should be within reach and usable from wheelchairs. Operable controls, including card swipes, must be within maximum reach heights (54 inches for a side reach, 48 inches for a forward reach). Writing surfaces must be 36 inches maximum from the floor. *Recommendations:* Adjustable features, such as shelves that can rotate out and machines that can be adjusted for optimum viewing from standing and seated positions will enhance access for the widest range of users. Consider that the standard eye level range of an adult seated in a wheelchair is 43 to 51 inches from the floor.





Security Bollards [7.4] and Security Devices

Bollards and rails used to keep shopping carts on the premises must allow an accessible clear passage (32 inches wide minimum) along at least one route for entry and exit. Alternative entries and accessible gates [4.13.3] can be used as long as they are not less convenient than other routes. For example, gates allowing wheelchair access cannot be locked or alarmed during times when the general public has unhindered access to the facility.

Inventory Control Devices

It is important that inventory control or security devices not obstruct required maneuvering clearances at doors. A minimum 12 inch clearance is required on the push side of swinging doors when the door has both a closer and a latch. This clearance is often useful at exterior doors without latches in countering the force of closers and wind resistance. When doors are automated, maneuvering space is not required.

Libraries [8]

Reading and Study Areas [8.2]

Access is required to at least 5% of fixed tables and study carrels. *Recommendation:* Specifications in 4.32, including clear passage for accessible routes, knee clearances and surface height (34 inch maximum) should be considered for movable furnishings as well.

Check-Out Areas [8.3]

Check-out counters at accessible lanes are held to a maximum surface height of 36 inches. Also required:

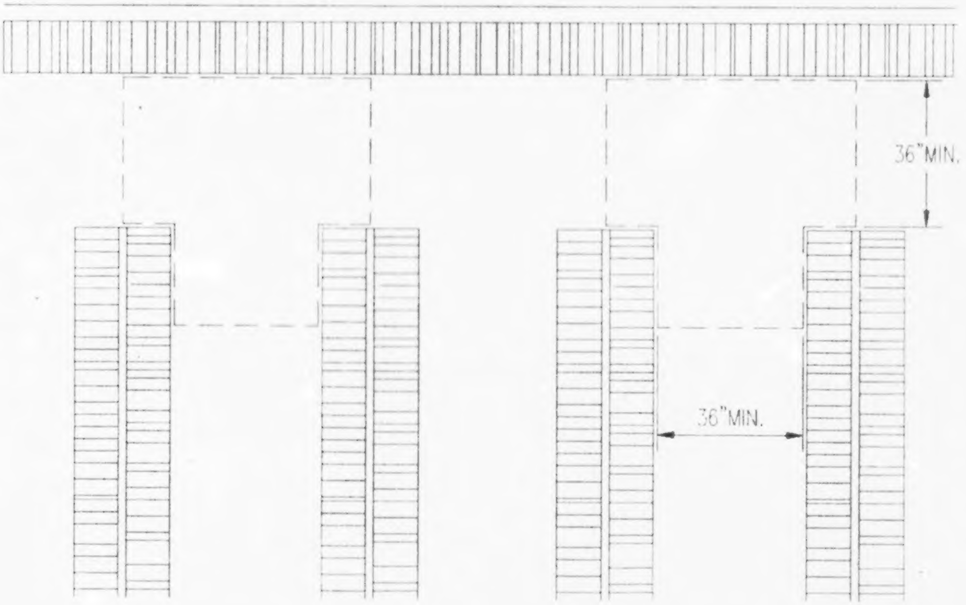
- an alternative route at turnstiles
- accessible gates [4.13.3] on accessible routes
- access through (or around) book security devices (see page 135)

Card Catalogs and Magazine Displays [8.4]

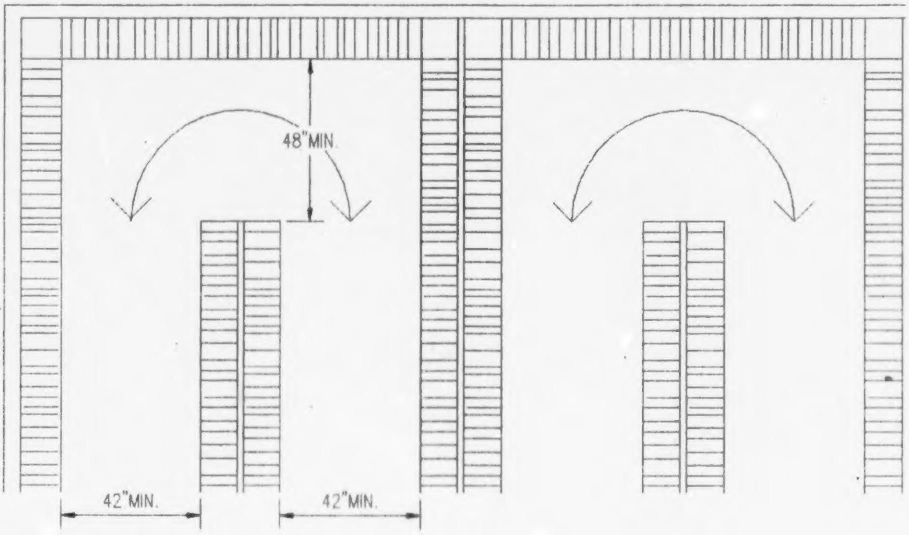
Specifications are provided for magazine racks and card catalogs but access is also important at computer terminals available to the public for library searches and other information. Requirements for fixed counters and tables [4.32] specify a surface height (34 inches maximum) and knee clearance below appropriate for extended use as a writing/work surface. Where the period of use is likely to be brief, or where standees are to be accommodated as well, requirements in 7.2 for sales and service counters (36 inch maximum surface height, knee and toe space for forward approach optional) may be appropriate as an alternative. The preferred maximum reach height for card catalogs is 48 inches (recognizing that users may be lifting or manipulating card drawers).

Stacks [8.5]

Elements fixed to stacks, such as ladders, cannot reduce the minimum passage width nor should signs or other elements between 27 to 80 inches above the floor project more than 4 inches into aisles. *Recommendation:* Consider accessible circulation around stacks so that people using wheelchairs need not backup for long distances. T-shaped turning space will provide space for wheelchair maneuvering.



Recommendation: Dimensions for turns around obstructions in 4.3.3 (ADAAG Figure 7) provide minimum space for maneuvering around stacks where a cross aisle at the end of stacks is not provided.



Accessible Transient Lodging [9]

Section 9 covers a range of facilities that provide sleeping accommodations but that are not used as permanent residences. Examples noted in the section (hotels, motels, resorts, dormitories, homeless shelters, and halfway houses) are meant to be illustrative and do not represent all types of lodging used on a transient basis.

In the case of the private sector, other types of residential facilities, such as apartment buildings, are not subject to the ADA (except for places of public accommodations within them, such as rental or sales offices). Note that distinctions made for purposes of ADA coverage do not coincide with building code classifications of "residential" occupancies. The Department of Justice provides technical assistance and guidance concerning the classification of "transient lodging." Housing constructed or altered by or on behalf of state or local governments is required to be accessible under the ADA (title II). Access to housing in either the public or private sector is also required by the Fair Housing Amendments Act of 1988.

General [9.1.1]

ADAAG applies to all public and common use spaces, such as hallways, corridors, and lobbies. ADAAG requirements include specifications for protruding objects in 4.4 and for signage in 4.30. Wall-mounted objects, such as light fixtures, must be selected and mounted so they do not pose a hazard to people with vision impairments. Objects with leading edges above 27 inches and below 80 inches above the floor cannot project more than 4 inches unless there is a tactile cane detectable cue below the object. Where room numbers are provided, they must be raised and Brailled and located on the wall at the latch-sides of doors for safety and uniformity. (Redundant room numbers and additional information not required to be tactile can be placed on the face of doors).

Minimum Number [9.1.2 and 9.1.3]

The number of accessible rooms required is based on the total number of rooms provided. Dispersion of accessible rooms among different classes (based on size, cost, amenities, etc.) is necessary. Rooms with combination roll-in/ transfer showers are required in transient lodging facilities with more than 50 rooms. The number of rooms with this type of shower must be added to the basic number of accessible rooms permitted to have an accessible tub or shower. Accommodations for people with hearing impairments are required in a portion of guest rooms, including all those that provide access for people with mobility impairments.

For example, a transient lodging facility with 100 guest rooms must have at least 5 accessible rooms, 1 of which provides a combination roll-in/ transfer shower. These rooms must also provide visual appliances for people with hearing impairments. In addition, at least 4 rooms must be equipped with visual appliances for people with hearing impairments; these rooms are not required to be wheelchair accessible.

NOTE: 32" minimum door clearance required in all sleeping rooms and suites

FACILITY TOTAL	VISUAL APPLIANCES ONLY Total	MOBILITY ACCESS & VISUAL APPLIANCES Total (portion of total with roll-in showers)
1 - 25*	1	1
26 - 50	2	2
51 - 75	3	4 (1)
76 - 100	4	5 (1)
101 - 150	5	7 (2)
151 - 200	6	8 (2)
201 - 300	7	10 (3)
301 - 400	8	12 (4)
401 - 500	9	14 (5**)
501 - 1000	2% of total	2% of total (**)
Over 1000	***	*** (**)

* EXEMPT: Facilities with 5 or less rooms for rent also used by the proprietor as a residence, but that do not serve as a homeless shelter, halfway house, transient group home, or other social service establishment.

** 4 + 1 for each 100 over 400

*** 20 + 1 for each 100 over 1000

Classes of Sleeping Accommodations [9.1.4]

Accessible sleeping rooms and suites must be dispersed among the various classes of sleeping accommodations available according to factors such as room size, cost, amenities provided, and the number of beds provided. The objective of dispersion is to give people with disabilities the same range of options that others have in staying at a place of lodging. However, where the different classes or types of sleeping accommodations is greater than the minimum number of rooms required to be accessible by the table, this does not mandate an increase in the number of accessible rooms that must be provided. In this case, operational practices may compensate. For example, if a person requests an accessible room with one bed, but the only accessible room is one with two beds (usually let at a higher rate), leasing the larger room at the lower rate can satisfy the requirement for a choice of room prices.

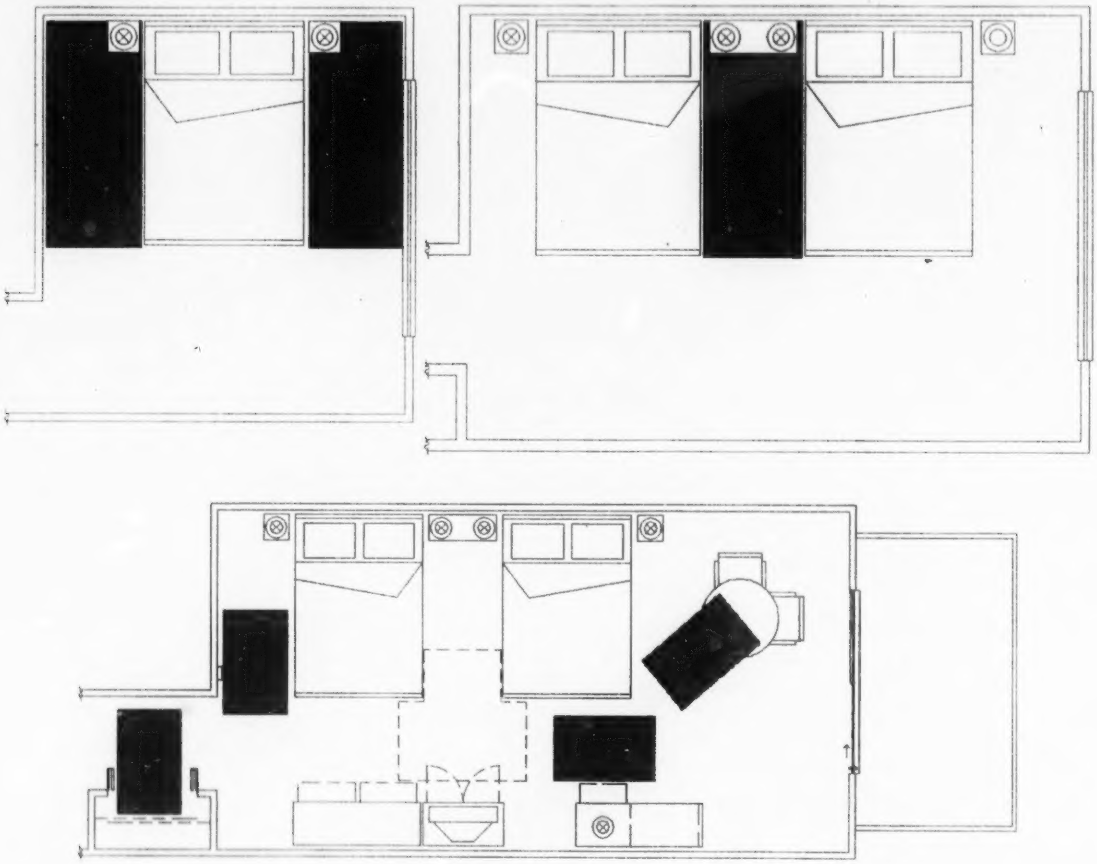
Alterations to Accessible Units, Sleeping Rooms, and Suites [9.1.5]

The minimum number of guest rooms required to be accessible in an alteration is based on the total number of guest rooms altered. This is required for all future room alterations until the total number of each required to be accessible for the facility overall is met. *Recommendation:* While the minimum number is based on the total number of sleeping rooms altered, it is recommended that the number be based on the total number of sleeping rooms provided where the intended scope of work allows the opportunity to do so.

Requirements for Accessible Units, Sleeping Rooms and Suites [9.2]

Bedside Clearances [9.2.2(1)]

Where one bed is provided in a room, maneuvering space at least 36 inches wide is required on both sides of the bed. If two beds are provided, this maneuvering space is required only between the beds. Note that the requirement for an accessible route to accessible elements and spaces may result in a 36 inch clearance on the other side of double beds nonetheless.



Clear floor space is required at accessible controls and elements (e.g., thermostats), storage facilities (e.g., closets), and should be provided at non-fixed furnishings (e.g., dressers, tables). An accessible route must connect with the clear floor space. Turning space can overlap required clear floor space, including bedside clearances.

Accessible Routes [9.2.2(2)]

An accessible route at least 36 inches wide must be provided to all accessible elements, including phones and thermostats, provided for use by room occupants, fixed or built-in storage facilities required to be accessible (closets, drawers, cabinets), and other spaces required to be accessible (living area, dining area, at least one bathroom and sleeping area, and patios, terraces or balconies, and carports, garages or parking spaces). *Recommendation:* ADAAG does not address furniture, but it is recommended that where dressers are provided, clear floor space should be provided so that people using wheelchairs can access dresser drawers.

Doors [9.2.2(3), 9.4]

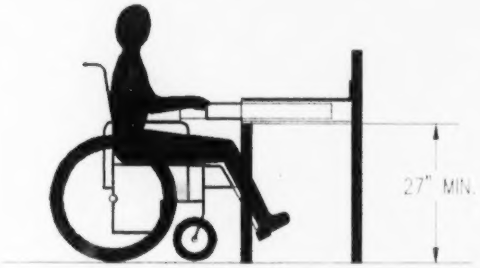
Compliance with 4.13 is required for all doors and doorways designed to allow passage into and within all sleeping suites or other units required to be accessible. *Recommendation:* An additional peephole in the door for people who use wheelchairs or who are of short stature is not required but may be desirable especially if one offering a wide angle view of the hallway or exterior is used.

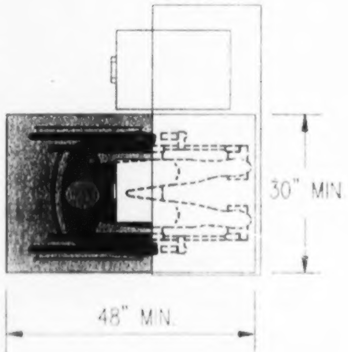
Because of the social interaction and visitation that often occurs in lodging facilities, an accessible door clear opening width (32 inches minimum) is required to and within all sleeping rooms and suites, even to those rooms not required to be accessible. This applies to all doors, including bathroom doors, that allow full passage.

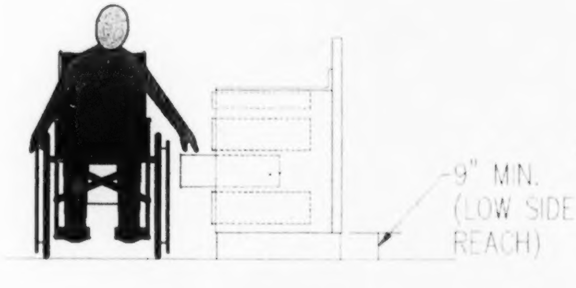
Storage [9.2.2(4)]

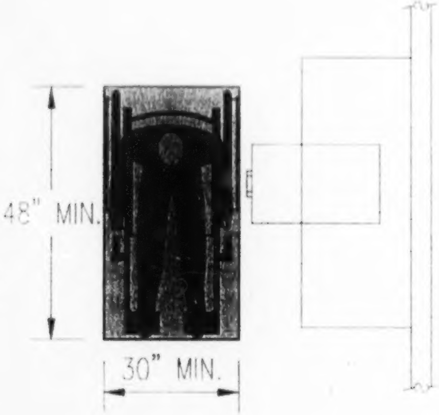
At least one of each type of fixed or built-in storage facility (cabinets, shelves, closets, drawers) provided in accessible spaces must be accessible as specified in 4.25. "Type" refers to the design of the element (shelving, cabinets, closets) as well as the intended use (coat closets and supply closets). Additional storage elements of the same type are not required to comply.

Clear floor space for either a forward or side approach is allowed. However, since people who use wheelchairs may not be able to reach much beyond the toes, a forward reach is generally limited to those storage elements providing knee and toe clearances. Otherwise, space should be provided for side approaches.









Controls [9.2.2(5)]

All controls in accessible units, sleeping rooms, and suites must comply with 4.27, which provides specifications for clear floor space, height of operable controls, and operation (see pages 96 and 97). These requirements apply primarily to those controls and operating mechanisms intended for use by patrons; those used only by employees and facility operators for purposes of maintenance or repair and similar purposes (electrical outlets for cleaning equipment, refrigerators, and clocks, etc.) are not required to comply.

Accessible Spaces [9.2.2(6)]

Where provided in accessible units, sleeping rooms, or suites, the following spaces are required to be accessible and be on an accessible route: living areas, dining areas, at least one sleeping area, patios, terraces, or balconies, bathrooms, and carports, garages, or parking spaces.

Bathrooms

Accessible bathrooms must provide an accessible water closet, accessible lavatory, and accessible shower or tub. If only half baths are provided, accessible fixtures are required in at least the one half bath required to be accessible. ADAAG allows provision of either tubs or showers in most accessible rooms. Some rooms in larger facilities must have a combination roll-in/ transfer shower. ADAAG covers several types of shower stall designs: roll-in, transfer, and, in hotels, a combination of the two. Typically a shower chair, a mobility aid more suitable for bathing than standard wheelchairs, is used with roll-in showers. Roll-in showers are most practical where shower chairs can be made readily available or where people may stay for extended periods (dormitories, dwelling units). The required folding seat in combination roll-in/ transfer showers offers greater flexibility by allowing transfer as well, particularly for people traveling without a shower chair. Two types of design for this combination shower are provided in ADAAG (Figure 57).

Kitchens, Kitchenettes, or Wet Bars [9.2.2(7)]

Clear floor space for either a forward or a side approach is permitted for cabinets, counters, sinks, and appliances. A forward approach to sinks (with knee and toe clearances below) is recommended for sinks that may be used more regularly or for extended periods of time, such as a kitchen in apartment-style dormitories. Counter tops and sinks may be no higher than 34 inches. At least 50% of refrigerator and cabinet shelf space must be within the reach ranges specified in 4.2.5 or 4.2.6.

Accommodations for Persons with Hearing Impairments [9.2.2(8)]

Accessible rooms or suites must also provide accommodations for people with hearing impairments (visual alarms and notification devices, volume controls on permanently installed telephones, etc). This is required in order to accommodate a person (or couple or family) who needs both types of access. Additional portions of rooms or suites are required to provide accommodations only for persons with hearing impairments.

Visual Alarms, Notification Devices and Telephones [9.3] Auxiliary Alarms

A portion of sleeping units in transient lodging facilities must have a visual alarm connected to the building alarm system or have an outlet for a portable device. Portable devices must be capable of being triggered by the building emergency alarm system. Appliances connected to the building system, where permitted by code, can be monitored by the building fire alarm system. Portable units have to be activated by a signal from the central alarm control system, transmitted to a receiver plugged into an electrical outlet. Note that there are operational considerations in making portable appliances available on an as-needed basis. Where portable devices are used, it is important that the appliance be checked to make sure it is functioning properly, and that correct and appropriate connections and placement are made, a responsibility which should not be left solely to guests or tenants who need the device. Because guest room sizes are not large, it is required only that the signal, which is intended to alert persons who are awake, be visible in all areas of the room or unit.

A visual signal is also important for single or multiple-station smoke detectors where provided in sleeping rooms or suites. A single appliance can be used to provide notification of the building system alarm and the room smoke detector alarm so long as the activation of the room's smoke detector does not activate the building alarm system.

Visual Notification Devices

Care must be taken that notification devices intended to signal a door knock or bell are separately wired. Like auxiliary alarms, these devices can be portable and made available as needed. In this case, ADAAG requires appropriate outlets and wiring.

Phones

Permanently installed telephones must be equipped with a volume control. An accessible electrical outlet within 4 feet of a phone connection is required to facilitate use of a portable text telephone (or TTY). (Facility operators are responsible for making portable TTYs available under ADA requirements that call for the provision of "auxiliary aids.") TTYs at hotel front desks will allow guests using TTYs in their room to access in-house services.

Social Service Establishments [9.5]

Section 9.5 provides requirements specific to halfway houses, homeless shelters, and group homes because they are a form of transient lodging and often designed for communal living. Where appropriate, scoping for accessible rooms can be applied to the number of beds. Alterations provisions recognize unique problems that may arise when shelters and similar facilities are placed in existing facilities designed for other purposes.

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